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- Set up a VPN connection

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09



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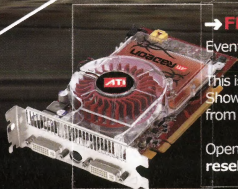
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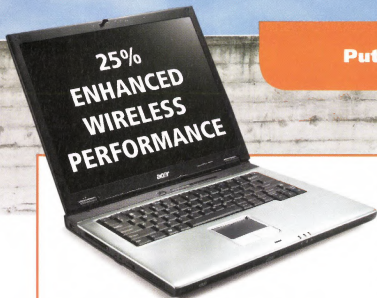
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This month's cover stories

Sweet spot upgrades

The sweet spot is the place where price and performance are in perfect harmony.

APC identifies the ideal upgrade components.



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Weird displays

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Will bigger, brighter and lighter displays change the way computers are used? Or will they simply cause more eye strain? *Simon Sharwood* stares into the future.

Serving power

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Time for your small business to get its own server? *Nick Race* compares seven sub- $\$5,000$ systems.

Shafting Intel

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GPU hackers are turning the super speeds of modern video cards against Intel, reveals *Dan Warne*.

Workshops

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James Bannan delves into video card optimisation and demonstrates how to set up a secure VPN tunnel; while *David Emberton* shows you how to give your HTML design skills a boost with Cascading Style Sheets.

Deciphering mobile data deals

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Internet-on-the-go is increasingly affordable but, as *Angus Kidman* discovers, knowing some industry tricks can get you a better deal.

Broadband directory

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ISPs rolling out next-generation ADSL2+ services are facing difficulties transferring customers from Telstra's network. *Dan Warne* reports.

Hyper-Threading

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Also known as hardware threads, Hyper-Threading is a processor-level technology which is revolutionising computing. *Nathan Taylor* explains.



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WORKSHOP

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Philips 200W6 20.1in wide-screen LCD
Compro VideoMate DVB-T300 tuner card
Sapphire Hybrid X800 XL 512MB
Panasonic Lumix DMC-FZ5
HP Photosmart 8750
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Microsoft Windows Server Update Service
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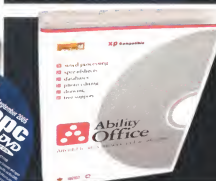
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- Adobe Reader 7.0 for Windows 2000/XP
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- ATI Catalyst Display Drivers 5.6 for Windows 2000/XP
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- Audacity 1.2.3 — for Mac OS 9
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- Awww Audio 9.2
- Awww Studio 9.2
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- Battlefield 2 playable demo
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- dvdauthor 0.6.11
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- DynDNS Updater for Windows 3.0.0.5a
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- HDTime 2.10
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- iPodder for Linux 2.0 Release Candidate 3
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- iZArc 3.5
- Java Runtime Environment 5.0
- JMax — for Linux
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- iPodder for Windows 0.9
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- KLUCCO Version 0.2.3
- Kristal 1.01
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- Linux Kernel 2.6.11.12
- LoadBlog 0.2
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Run Linux from the DVD!

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for x86 — boot from the DVD, or install.



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- Mozilla Firefox 1.0.4 for Mac OS X
- Mozilla Firefox 1.0.4 for Windows
- Mp3Tag 2.31
- MPC Batch Encoder 2.3.1
- MuSE 0.7.2pre1
- muvee autoProducer 4.1 (full retail version) trial
- muvee autoProducer 4.1 CE (Special Edition)
- NeoOffice/J 1.1 for Mac OS X
- Netpms 5 (10.26.11)
- Netixid 1.1
- Nimix 1.3.1
- NMP3 Ripper 0.6.8 — Mac OS X 10.1 and below
- NMP3 Ripper 0.6.8 — Mac OS X 10.2 and above
- Now Playing
- NTFS Reader DDS Boot Disk Version 1.0
- Nvidia ForceWare for Windows 2000/XP 77.72
- Nvidia ForceWare for Windows 9x/Me 77.72
- Nvidia Linux 4.32 Accelerated Driver 1.0-7664
- Ogg Vorbis for Awave
- Paint.NET 1.0
- Photo Album Builder 1.7
- photoarchive 1.2
- PhotoEdit 1.3.2
- PhotoPerfect DigiCam 1.0.5
- Poddler 1.03
- Podcast Feed Creator
- Podcastmatic 1.1
- Poddler 1.03
- PodFFile 0.22.2
- PostMaster Version 1.3
- Pro Tools 5.01 R2 FREE
- Pro Tools 5.01 R2 FREE
- Protected Storage Password Version 1.6.2
- Psycle 1.7.6.2
- Reish Partition Manager
- Restoration Version 2.5
- Ripper X 2.6.6 — rpm file for Linux
- Ripper X 2.6.6 — tar.gz file for Linux

- Sloopz 5
- Sonicart 2.2
- SoundByte 2.4.0
- Spambinator 0.0.9
- Spybot — Search & Destroy 1.4
- sunShield v1.02
- SuperCollider 3 — for Mac OS X
- SuperCollider 3 — for Mac OS X
- SuperCollider 3 — for Windows
- Sygate Personal Firewall Version 5.x
- TagScanner 4.9 beta2
- The GIMP 2.2.8
- The GIMP 2.2.8 (GTK+ 2)
- Thomson Demo mp3PRO Player/Encoder 1.1.0
- Trend Micro ScanMail Version 2.699.00
- TriTag 0.8
- Ubuntu 5.04
- Ultimate Boot CD for Windows Version 2.5
- UnRAR 2.0
- Varsha 0.75
- WebForm version 1.9
- WinBackup 1.86
- Windows Media Player 10 for Windows 98 SE/Me 2000
- Windows Media Player 10 for Windows XP
- WinPodcast 1.0.3
- XMS Version 1.1
- YubiBurner 0.7.0
- Zebra Scanner Version 2.0.2
- ZipGenius 6.0.2
- ZoneAlarm Free Download Version 5.094_000

MP3s

- Antimateria — Mission Control
- Barry Harte — ALL YOUR'S L.G.
- Bloodstone Darknight — Burning Bridges

- Bivv Dece — No John Doe
- Celestial Crown — For the End of the Days
- Circle of Willis — Time Ain't Long Enough
- Comrad & Lucy Doll — How Can This Take So Long
- Cypher Assassins — Don't Play
- DataStream — Sugar & Cream (Hardcore Edit)
- DJaxx — Let Go
- Dropzone — Skeptical
- Drunken Gunmen — Journey to the Far Side of the Sun
- GMAngelard — Mo's Groove
- Grund Child — Dark Rain
- Interitus Dei — Queen of the Undead
- Italo Roots Players — Herbsman's Quest
- KARMA FUSION GRIDUP — Expectation
- Life Immitating — Rehab
- Lo' G — Hard Timez
- Magica — Bittersweet Nightshade
- Neptune — Yom Kippur (Original Mix)
- Spinwarp — Six Foot Under
- Tim Hardings Cotton Club Orchestra — Jig Walk
- Titany — Jeopardy
- Unleash the Nugget — Peanuts

PDFs

- Mastering Linux, part 10
- Mastering Linux, part 9
- Mastering Linux, part 8
- Mastering Linux, part 7
- Mastering Linux, part 6
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Home and away

To paraphrase Roy and HG, too much technology is never enough. But as computer enthusiasts start turning their homes into extensions of the datacentre thanks to the explosion of wireless home networks, media servers, Unix-based OSes and so on, new rules are needed to make the technology work. Rules the IT department lives by.

A quote from APC's Extreme Geek of the month, Craig Wiley (page 16), really struck a chord with me. He has set up a 24-port network at home, including a Linux mail server and multiple Windows PCs. He does this for fun, but in order to make it all work in the domestic environment he has to treat his family, he says, as "IT customers".

I know exactly what Craig's saying, and I suspect a lot of APC's readers do too. My wife recently decided she'd be better off taking the kids away for the weekend after I issued a warning that all computers and the network in the house would be down for an extended period for major upgrading and reconfiguration, and nothing connected through them (including the TV) would work.

While the interruption caused by the upgrade wasn't received warmly, I was simply following standard IT procedure. As increasingly complicated technology moves into the home, the easiest way to manage it is with the same computing processes and rules as implemented in the workplace by the IT department.

At home, I'm always getting requests for

extra system capabilities, and like any IT department, I don't want to seem unhelpful. But my eight-year-old daughter doesn't quite realise that setting up an IP camera system so she can check on her stuffed toys when staying with her grandparents isn't easy.

As ridiculous as it sounds, I find the only way these requests can be treated on their own merit is by establishing a process where requests are vetted against budget priorities by all the stakeholders (the wife and kids). If

approved, they are turned into official projects starting with a requirements gathering phase, moving through the various milestones towards completion. If systems are going to be down, best to do it on a weekend when staff

— oops, family — can easily leave the house.

Another example of the trend towards the home and datacentre merging is that many of you recently installed Solaris from the July APC cover DVD. I never thought I'd live to see the day Solaris, the mainstay of many a datacentre, would turn up on home computers. For those readers who had trouble connecting it to a network, turn to the tutorial on page 120.

This month's cover story on sweet spot upgrades (page 76) should also help any IT manager (in the office or at home, paid or unpaid) fielding requests for component upgrades, pointing to the best "bang for buck" hardware and also the dream systems for those who can afford them.

To paraphrase Roy and HG, too much technology is never enough

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Need to Know

News, views and analysis from the IT world

Apple

Inside Apple's jump to Intel

Redesigning the Mac architecture to take Intel CPUs is a tricky task for Apple's engineers, Angus Kidman reports.

While happy to boast that a clandestine engineering project has seen OS X running on Intel for the past three years or more, Apple has been cagey about the specifics of its upcoming Intel-powered Macs. The lack of details has been exacerbated by the company's litigious nature in the face of leaks and the lack of Mac clone manufacturers.

Apple has had to balance two largely opposing objectives: taking advantage of the features of the Intel processor family for maximum performance while ensuring that its OS can't be readily run on standard PCs.

With the first Intel-powered Macs not due

to arrive until 2006, one of the few points of certainty is that Apple won't be making Mac OS X available in a form that can readily run on existing PCs. This is despite Michael Dell, chairman of international PC manufacturer and vendor Dell, proclaiming he'd be happy to sell such systems.

The hacker community is already gearing up to try to make the Unix-based OS run on conventional PC hardware. However, the lack of source code will make that a challenge, as will Apple's expected use of the Intel platform's Trusted Platform Module security technology to restrict where the OS can run.

Even if such a workaround hack is developed, it's very unlikely to be simple enough to implement to cause a mass migration away from Windows.

While PCs are typically designed using a range of standard components alongside the processor, many observers expect Apple to develop its own chipsets housing the Intel processor, enabling it to maintain tight control over other aspects of hardware. That approach would virtually guarantee that the existing PC/Mac price differential would continue.

Also in Need to Know:

18 Microsoft's

Photoshop assassin

APC asks Microsoft's Forest Key, formerly of special effects superstar Industrial Light and Magic, if building a Photoshop-killing app is a mission impossible.

22 Feature

Hijacking the GPU

GPU hackers are turning the super speeds of modern video cards against Intel, reveals Dan Warne.

30 Watchdog

Vanishing credit, vendors playing the blame game and a language barrier are all causes of readers' customer service headaches.

34 Opinion

The public hasn't warmed to paying \$4,000 for a media centre PC, but that's about to change, according to John Gillyooly. Guess what? It's time to upgrade all your Microsoft products. Again. Mary Jo Foley is less than excited too.

36 Epinions

APC readers have their say.

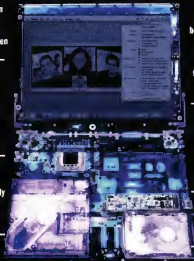
Apple + Intel Inside Inside the next Apple PowerBook

Expect Apple to launch its next major PowerBook with enormous fanfare. Apple's fan base has been sorely disappointed that until now the company has had to stick with the slow and outdated G4 processors for its PowerBooks, despite their sleek looks. Here's what Apple could do with its new Intel-based platform:

HIGH DEFINITION: as interest in high definition video increases, Apple may join the ranks of vendors that offer HD wide-screen laptop displays.

DOUBLE SPEED: dual-core "Yonah" CPU – none of the heat dissipation woes it faced with the G5, and the speed of two processors in a notebook.

BUILT-IN DONGLE: Apple is likely to use Intel's Trusted Platform Module chip to ensure OS X can only be run on "Mac PCs".



MACTRIND: Apple was one of the first vendors with MIO 11G, even before it was standardized. Expect an early release of SD2.11n, the long-range MIMO (multiple in/multiple out) wireless networking standard that will offer real-life transfer rates of about 45MB/s and much better in-building signal detection.

SLOT MACHINE: with flash memory cards in such wide use now, expect Apple to add slots for the most popular formats – SecureDigital (SD) and CompactFlash (CF).

BROADBAND: PowerBooks could include WiMax receivers for access to city-wide broadband networks.

Is it "still" legal...

...to run a P2P network?

While considering a case against Grokster in June, the US Supreme Court made a rare unanimous decision overruling a lower court's finding that distributors of file-sharing software couldn't be sued if their software allowed widespread copyright infringement.

However, the judgment didn't go as far as outlawing P2P technology altogether.

US law is persuasive but not binding in Australia, so the status quo will continue for the time being. Local P2P distributors, however, are on notice that vigilance will be required in the future.

Alon Crawford is a lawyer with Henry Davis York.

alon_crawford@hdy.com.au

Disclaimer: this does not constitute legal advice.

Dodgy iPod batteries EXPOSED

Apple has settled a class action overseas regarding faulty iPod batteries, but Australians will get nada.

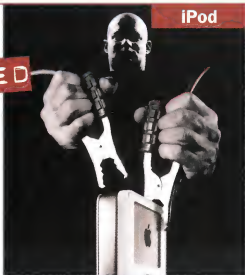
Owners of iPods in the US will get gift vouchers, extended warranties and replacement batteries if their iPods don't meet the advertised targets for battery life and continuous playback.

However, people who bought iPods containing exactly the same batteries living elsewhere in the world, including Australia, will get nothing.

In response to APC's enquiries, Apple Australia's marketing director, Rob Small, provided this cryptic response: "If their iPod is faulty, owners should submit it through the usual AppleCare process. If the battery is genuinely faulty, Apple will prepare a quotation for its replacement".

Andrew Perry, national head of the IP and technology practice for Gagens Lawyers, said Australians will only receive compensation if they start their own class action.

According to Perry, a less problematic route for disgruntled local consumers would be to submit an official complaint as individuals to the Australian Competition and Consumer Commission (ACCC).



Terminal illness: while US iPod owners are eligible for goodies from Apple, Aussie owners have been stiffed.

the organisation responsible for policing misleading and deceptive conduct by companies.

"The ACCC will often consider overseas events when deciding whether to take action in Australia, and will take consumers into account when settling actions with an offending company," said Perry. "This can involve the free repair or replacement of affected goods."

Tim Goden (no relation to Godens lawyers)



Inside Apple's jump to Intel

One of the main motivations for shifting away from the IBM-supplied Power architecture is the desire to develop faster-running notebooks. These would almost certainly use Pentium M technology, which won't suffer from the overheating problems Apple has experienced trying to run G5s in prototype PowerBooks.

However, challenges involving backward compatibility could work against Apple's performance ambitions. Apple is encouraging developers to use its Developer Transition Kit and work with its so-called Universal Binaries, which allow code to run on both PowerPC and Intel-based Mac OS systems using an emulator called Rosetta.

To overcome the performance limitations imposed by dual architecture code and emulation, the new machines will need to take advantage of the virtualisation features on newer Intel chips. In the short term, add-in Intel cards for G5 machines will allow native code execution for both. That could stop people holding off on new Mac purchases, but anyone running such a dual-card system can expect a power consumption hit.



Beyond the flash, Longhorn will actually have useful functions for home users.

The cold sweat and panic that accompanies saving over a crucial file by mistake should become a thing of the past in the next version of Windows.

Whenever a user saves a file, the previous saved version of the file will be stored by the operating system, allowing users to easily skip back to an older version of that file. This is effectively a type of "auto save" for every type of file and document, according to Chris Jones, head of the Windows core operating system development team.

This technology is already used in Microsoft server products, such as Small Business Server 2003, and is now viable for home users with the enormous hard drive capacities in today's desktop PCs.

Microsoft's Windows Server boss, Bob Muglia, also revealed in an online chat that the software giant was investigating making a



Gimme the beef: Windows Server for home users could bring the server farm directly to your study.

home version of Windows Server.

Redmond is working on getting these basics right in its first beta, and will reveal its new 3D graphics system in later betas.

Don Worrie

PCs choke on HD

Think your PC is fast enough? High definition video will test its mettle. *Dan Warne reports.*

Many PC users are discovering that their machines aren't up to the task of decoding and playing back HD video.

Interest in next-generation high definition DVD (HD DVD), which can have resolutions as high as 1,920 x 1,080 pixels at 30fps, is being spurred by Apple, Microsoft and others posting spectacular HD movie samples online (see "Inside Info" for links). The files use around 60MB for each minute of HD video, allowing only 12 minutes to be squeezed onto a 650MB CD or 80 minutes on a 4.7GB DVD.

Despite the large file sizes, HD video is actually much more compressed than MPEG-2, requiring greatly increased processing power for decoding in real time.

Video card designer ATI said it has a solution to the problem. Its new R520 graphics processing unit, yet to be released at the time of writing, has built-in MPEG-4 H.264 high definition acceleration. However, ATI's acceleration won't help with playback of Windows Media Video High Definition (WMV-HD), a competing standard for HD DVDs.

Competitor NVIDIA said its GeForce 6 and 7 series cards already have WMV-HD hardware acceleration using its PureVideo system. To activate this functionality, users must download Windows XP hotfix 891122 from Microsoft's Web site and use the latest NVIDIA drivers. The company also plans to update its drivers to support H.264 HD decoding acceleration by the end of this year.

For those without a video card capable of HD playback acceleration, Microsoft's minimum system recommendation for WMV-HD is a Pentium 4 3GHz with at least 512MB RAM and a 128MB video card.

Apple says a dual 2GHz G5 with 512MB of RAM and a 128MB video card is required to handle playback of H.264 HD (no PC requirement was stated as the PC version of QuickTime 7 hadn't been released at the time of writing).

High definition video usage is expected to escalate in the next 12 months. Sony has released an HD consumer camcorder, the HDR-HC1, for \$3,499. This, along with the emergence of Blu-ray and HD DVD, provides one of the first genuinely compelling reasons to upgrade to faster CPUs.

Inside info

- Microsoft's WMV HD gallery
www.wmvhd.com
- Apple's QuickTime H.264 HD gallery
www.apple.com/quicktime/hdgallery
- How ATI's H.264 acceleration works
http://ati.com/products/pdf/H264_Whitepaper.pdf
- NVIDIA PureVideo
www.nvidia.com/page/purevideo.html
- Microsoft Hotfix for NVIDIA PureVideo support
www.support.microsoft.com/default.aspx?scid=kb;en-us;888656

HD video

High definition playback options

NEW PC

Dell Dimension 5100, \$1,399.
To meet Microsoft's WMV-HD requirements (Pentium 4 3GHz, 512MB RAM, 128MB video card capable of 1,920 x 1,080 resolution). No display.

PC UPGRADE

ASUS 128MB NVIDIA GeForce EN6600GT video card, \$329.
Reduces system requirements for 1080p playback providing you install the Microsoft hotfix for XP to enable PureVideo.

NEW MAC

Dell G5 PowerMac, \$3,199.
To meet Apple's QuickTime 7 H.264 high definition requirements. Dual 2GHz G5, 512MB RAM, 128MB video card. No display.

HD MONITOR

Dell 24in high definition monitor, \$1,799.
1,920 x 1,200 resolution, 24in diagonal size, dual DVI connectors.

HDTV

Samsung 32in Slimfit HD CRT TV, \$1,799.
1,920 x 1,080 interlaced resolution (1080i), 32in diagonal size, 5,000:1 contrast ratio.

DECODE

PhotoMail

What is it? Yahoo's new free service that lets you send up to 300 photos on one email. Yahoo cheats a bit by building an online photo album and just emailing thumbnails, but the whole process is automatic.

Should you care? Email is one area where innovation is sorely lacking. Yahoo is addressing the problem of email attachment size limits in a clever way.

Verdict? Hopefully this sort of automation will find its way into mainstream email clients. Are you listening, Microsoft?



MICROSOFT DITCHES WINDOWS

Apparently not even Microsoft can get Windows Server 2003 running stably under high loads. The admin team for Microsoft.com (one of the largest Web sites in the world, with 40Gbit/s outgoing traffic) was having to frequently restart server processes manually "because they were literally suffocating," according to US-based Windows program manager, Clyde Rodriguez. So who's to blame for this dotcom cock-up? It seems a shame to drop Rodriguez in it, but he did lead the development of Windows Server 2003 SP1. (To be fair, the problem was fixed by upgrading the server farm to x64 Windows, also Rodriguez's handiwork.)

Want to nominate a dumbest moment in tech?

Send an email with the subject line Dumbest Moments to dwarne@acpmagazines.com.au. All correspondence becomes the property of APC.

In brief news



FREE MCAFEE ANTIVIRUS

ANZ is offering 12 months' free use of McAfee VirusScan and Personal Firewall to its Internet banking customers. The offer is only for new McAfee customers, not existing ones. ANZ users can claim their free software by logging in to Internet banking and clicking on the banner ad.



NO IE7 FOR WIN2K

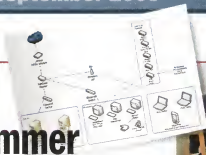
Internet Explorer version 7 won't be able to run on Windows 2000, according to Microsoft. "One reason is where we are in the Windows 2000 lifecycle. Another is that some of the security work in IE7 relies on operating system functionality in Windows XP SP2 that is non-trivial to port back to Windows 2000," wrote a Microsoft developer on Microsoft's official "IEBlog".



CUT-DOWN XP TO REPLACE NT4

Microsoft is working on a super cut-down version of Windows XP, codenamed "Eiger", in a bid to convince companies to finally let Windows NT 4 die. Eiger will run on PCs which can currently run NT 4 but will include many of the security enhancements in XP. Microsoft Australia declined to comment on pricing or timing.

Digital diagrammer



Craig Wiley probably isn't the only APC reader who "cops grief" when the home server goes down.

Like many of us, Wiley is the live-in installer, integrator, helpdesk and server admin for his family's 24-port network, which includes a Linux mail server, Windows-based home entertainment and Web server, five desktop PCs, five network switches/routers/modems and a home theatre system that can route audio to the kitchen, lounge room and back deck.

Wiley doesn't take all this responsibility lightly. The network architecture is documented and diagrammed down to the last detail, just in case an external vendor ever needs to be brought in to work on the system.

"There's nothing really 'techie' about our setup — it's just Web, email, music and video," Craig said. "Everything I've done has been with the family in mind. I've treated it like having an IT 'customer' at home." The "wileyfamily.com" domain name has allowed him to change ISPs freely according to who has the best deal.

Craig said he is so comfortable with technology that his next step might be to set up a home-based eBay business. That might be a good idea, because he wouldn't tell APC how much the whole system cost. The reason? "My wife might see it!"

Dan Warne

Extreme geek



1. In Craig's office, every day is casual Friday.
2. The ultimate in car port bling — a surround sound system.
3. Structural engineers advise that one more peripheral could crumble the home's foundations.

HOW GEEKY ARE YOU?

Have you wired up your car? Shared your home media library with five family members in three states? Made a 16 terabyte file server? If you've done something interesting with computing technology, APC wants to hear about it. Email a description of your project to dwane@apcmagazines.com.au and include photos (we need at least one of you pictured with your gear!) The most extreme geek each month wins a very cool prize and everlasting fame in APC.

Data dump

Total capital raised by wireless broadband network Unwired over the past five years, yet it's still only available in Sydney.

\$250 million

35%
Proportion of employees who quit their IT job despite their employer offering them more money to stay

Source: Hays salary survey

26%
Proportion of employees who quit after staying a further 12 months

800
Number of warning notices issued to Australian ISPs for hosting allegedly pirated material in May 2005

Source: AustralianIT

20,000
Number of notices issued to ISPs in the US in the same time period

US\$775 million
Amount Microsoft is paying in damages to IBM as a result of the US Government's antitrust case

Source: AustralianIT

US\$75 million
Value of free Microsoft software the company will give IBM to use in-house

164 million
Number of people worldwide who have a broadband connection

Source: ZDNet

50 million
Number of people in China who have a broadband connection

Source: Washington Post

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Microsoft's Photoshop assassin

The software giant has released the public beta of Acrylic, the app it hopes will topple Photoshop, Adobe's undisputed king of the graphics world.

Dreamweaver, Flash and Photoshop are clear winners over GoLive, LiveMotion and Fireworks. Can you really break into this market?

There's always room for innovation. Of course, we don't think we'll succeed in an entrenched market just because we are Microsoft. It requires an understanding of customers' needs [and] being passionate about meeting them.

Can anyone really improve on Photoshop after 15 years of finetuning?

I think when you have a product that works and allows you to do your job, you tend to feel that's the way the world should be. But when innovation comes around and people see there are

better ways to do things, they are pretty quick to switch.

People were happy with 3D Studio Max and so on, but when Maya came out it really pushed the industry forward. People realised it was a significantly better way to do what we were all doing before. Since then, we have seen tremendous innovation in all the 3D tools.

Are you disappointed by the bitter criticism of the Acrylic beta so far?

I think it has surprised the design community because betas of graphics products traditionally haven't been publicly released. Over a thousand different points of feedback [were registered],

so we're thrilled with the results. That's exactly what we're after — to figure out how to proceed and invest in the product.

What's your favourite feature in the Acrylic public beta?

Well, one great feature is a nifty panoramic photo stitching feature that can take a bunch of photos, stitch them together, do colour correction and even fix distortion from the camera lens. Microsoft Research does some amazing, science fiction-like stuff with computer graphics. We are looking at how we can include that innovation in Acrylic.

Microsoft Office really sucks for graphics. Will you lobby for improvement?

Exchange



We will certainly invest heavily in making Acrylic interoperate well with Office, especially with PowerPoint, where a lot of graphics end up residing for presentation purposes.

I can't comment from the perspective of what the Office team plans to do, but with the boom in digital photography, there is clearly strong interest in graphically rich documents.

Forest Key is responsible for building Microsoft's Photoshop-killer, Acrylic, now in public beta. He spoke to Don Worne.

Linux to lose DVD playback?

Open source DVD players will be a thing of the past if legislators have their way.

When the Free Trade Agreement (FTA) between Australia and the United States came into effect at the beginning of this year, Linux-based DVD players, which rely on a "DeCSS" hack to decrypt DVDs, became illegal to use or distribute in Australia. The FTA makes any technology that gets around copy protection illegal.

Of greater concern, however, is the tough new European patent legislation which will make it easier for people to be sued for patent violation. (The legislation was recently defeated, but threatens to rear its head again.)

All of the major open source DVD players use the FFmpeg utility for video and audio conversion. If the legislation is passed, patent holders will demand stiff royalty payments for the implementation of their conversion idea in FFmpeg. Open source developers will be unable to pay, and the players will become illegal. The same threat faces open source MP3 players, file compression utilities and other standards-based projects.

The developers of Linux DVD players VideoLAN and MPlayer have posted notices on their Web sites warning that the software may be pulled from circulation without notice.

The French developer of the VLC Media Player, Rémi Denis-Courmont, labelled the legislation "shameful". He said he'd already been forced to remove DTS sound decoding (commonly used on DVDs) due to a complaint from a patent holder. "If we're lucky, nobody will come after us."

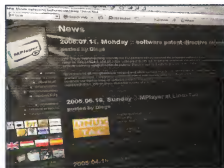
Tim Gaden

Life is expensive

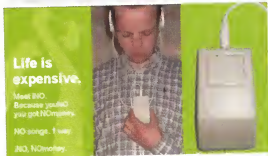
"iPod shuffle. Life is Random. 240 songs. A million different ways."

Does glib advertising for overpriced gadgets make you feel like a pleb because you can't afford to rush out and buy one? Mark Hoekstra has the antidote. He took an old Apple ADB mouse, cut off the cord, and attached a pair of stolen hospital headphones. Anyone can afford this Apple-branded gadget, he said.

"Life is expensive. Meet iNO. Because you got NO money. NO songs. One way."



MPlayer asks its users to inform politicians of the issues and ensure "they pass sensible legislation".



As an added bonus, it makes Michael Bolton sound okay.

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Networking

Dodgy Wi-Fi claims dumped

Truth in advertising for networking product performance? It's about time.

Linksys has announced that it will now market its new multiple input/multiple output (MIMO) router based on real life performance rather than the "maximum theoretical speeds" used by other manufacturers.

"With our new SRX router, the speed you'll get is listed on the box, and we stand behind this claim," said Linksys CEO Victor Tsao. "We have been very conservative about this. The claim is eight times faster and three times further than standard G."

The company's corporate communications manager, Karen Sohl, added, "In our testing labs and third-party testing labs, we have concluded that, on average, customers will see about a 42 to 45Mbit/s data rate of wireless speed using the SRX. This data rate may vary based on users' environments, but this is the average consumers can get. We do not market this number or have this number presented in any materials because we cannot guarantee this is what consumers will get."

Wireless networking companies have been advertising 802.11g hardware as being capable of 54Mbit/s for several years, despite user frustration that real-life speeds are usually well below 20Mbit/s.

Sohl said the whole industry needs to clean up its act. "Linksys will continue to market our products as Wireless-G, Wireless-G with SpeedBooster or Wireless-G with SRX. We will not call the products 108 or 54."

The company also warned consumers to be wary of vendors that have launched



Linksys CEO Victor Tsao said the SRX router will actually achieve its advertised speed.

wireless routers using a "Pre-N" label. There was no official draft standard, so manufacturers could not be sure they would be able to meet the expectations of consumers that the "pre-N" products would be hardware-compatible or upgradeable to the final standard when released.

The Linksys SRX wireless router employs technology similar to what will be used in the 802.11n standard, but the company is open about the fact that to attain the speed and coverage benefits, users will need to use proprietary SRX client-hardware in their PC.

Dan Warne

DREAM SYSTEM

Airbus A380

It may be illegal to have a television anywhere within view of a driver on Australian roads, but commercial airline pilots are being cut some slack with the introduction of cockpit Internet access on the world's largest passenger aircraft, the Airbus A380 "superjumbo".

It's not just the pilots who will benefit — all 555 passengers will have Internet access from their seat.

If the Internet doesn't keep you amused, options available to airlines include a built-in casino, bar, relaxation area or gym.

Qantas has ordered 12 of these oversized bables for delivery in 2007. If you can't wait till then, a cool US\$292 million will score you your own jet — delivery not included.



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If you thought you couldn't afford to buy a colour laser printer, now you can't afford not to. For a limited time, when you buy the low cost CL4000DN, Ricoh will reward your business with a choice of three bonus products valued at \$499 RRP each.

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Ricoh. How well do you share?

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*A manufacturer's suggested cost to print a single-sided A4 page inclusive of GST and excluding cost of paper. Rate based on cost of toner cartridge and rated cartridge yield using industry standard 5% coverage. All bonus offers valid for purchases of the Ricoh CL4000DN between 01/08/05 and 31/10/05. Limit of one bonus product per CL4000DN purchased. Limit of five bonus products per organisation. All bonus products valued at published RRP as at 01/07/05. Visit ricoh.com.au for full terms and conditions.



Black and white prints for 1.4 cents per page.
How low can a colour printer go?

RICOH
Image Communication

Hijacking the GPU

GPU hackers are turning the super speeds of modern video cards against Intel, reveals Dan Warne.



NVIDIA's chief scientist David Kirk is guarded about where the video card company is going with general purpose computing on GPUs.

Wired seized on the comment, running a cover that screamed "Bigger than Intel" alongside a picture of NVIDIA CEO Jen-Hsun Huang. Huang now says he deeply regrets that those comments were made — and that he posed for the photo.

Following the *Wired* article, relations between NVIDIA and Intel turned frosty (it didn't help that Huang was a former AMD executive). To make matters worse, there were persistent industry rumours that a merger between the two companies was in the works.

The upshot was that when NVIDIA launched its nForce motherboard chipset, it could initially only make it available for AMD processors, despite having been developed with the capability to work perfectly with Intel CPUs. In fact, unbeknown to many, the nForce chipset drove the modified Intel Pentium III CPU inside Microsoft's Xbox console.

It was three years before NVIDIA got over "the *Wired* curse", as one of the company's senior executives put it, and restored relations with Intel. Today, nForce motherboards work with Intel CPUs, and Huang is at pains to position NVIDIA as an "experiential processor" designer, not a microprocessor maker.

But if what Huang says is true and not merely spin to keep relations with Intel friendly, the company is becoming a victim of its own success as the open source community powers ahead in an alchemical effort to turn untapped GPU power into speed for non-graphics applications.

So when APC asked what NVIDIA was doing to make GPU power available for other programs, the company's chief scientist David Kirk considered the question carefully. "We're certainly not making GPUs with general purpose computing in mind. Our GPUs are engineered to do graphics as fast as possible."

But Kirk admits that in a recent contest to build the world's fastest database server, the winner was a university professor who ported SQL software to run on an NVIDIA GPU.

For a company which claims it isn't setting out to beat the Pentium, NVIDIA is providing a surprising amount of help to developers to encourage them to write general purpose software that takes advantage of GPU power. Its new GPU programming guide, *GPU Gems 2*, includes a whopping 136 pages on doing general purpose programming on GPUs.

A long-forgotten Slashdot discussion reveals that the maintainer of GPGPU.org, the

In a nutshell

■ GPUs have massive computing power compared with CPUs.

■ GPU performance is improving at a rate of up to 300% per year, compared with 140% for CPUs.

■ The latest GPUs are not hard-wired for graphics processing; their architecture can be programmed using software.

In June, video card giant NVIDIA unveiled its latest 300 million-transistor creation, the GeForce 7800 GTX. It's easily the fastest video processor ever created (see review, page 42).

The 7800 GTX can thunder through 165 billion calculations per second (gigafllops), enough power to render games in high definition with all the visual effects turned on and still achieve cinematic framerates. But the number of enthusiasts prepared to shell out around \$1,000 for this kind of visual experience in computer games is small compared with the potential market that would benefit from a massive boost in the overall computing power in their PC.

Moves are afoot to repurpose the massive processing power of modern video cards for general, non-graphics computing tasks.

"What we can do in the next five years is going to blow your mind," NVIDIA's vice president of investor relations Mike Hara told *Wired* magazine in 2002. "In 10 years, we should be bigger than Intel."

community site dedicated to general purpose computing on GPU units, is Mark Harris of NVIDIA, a technical developer relations expert famed for his research into computer graphics.

TECHNICAL CHALLENGES

While there is seemingly endless processing power available on GPUs, re-engineering software to harness it isn't easy. While CPUs are designed for straightforward serial processing — one calculation after another — GPUs are massively parallel. The 7800 GTX GPU has 24 pipelines that simultaneously work to burn through umpteen "shader" calculations, the process of applying textures, lighting, extrusion and other visual effects to three-dimensional onscreen images.

This processing power can be hijacked for tasks that are by their nature parallel, such as databases combing through enormous data sets, or data compression and decompression. But it can't easily be harnessed to speed up everyday computing tasks like running an office package or browsing the Web.

In one sense, that's not a problem. There's already more than enough processing power for everyday computing with current generation CPUs. It's the next generation of computing tasks — playing and

editing high-definition video, multitrack sound editing, working with thousands of high-resolution digital images and doing mathematically intensive tasks like face recognition and three-dimensional modelling — where more computing power is needed.

Video cards have traditionally been "hard wired" to do a set of very specific graphics tasks, making it impossible to process other types of data. But this is changing with the introduction of programmable shader pipelines in modern cards.

A shader is a small program that applies a visual effect to a pixel or geometric shape. Each "pipeline" in a GPU can be loaded with a single shader program. Raw pixel data gets fed into one end of the pipeline and emerges from the other end with the shader effect applied. The 7800 GTX GPU allows programs with up to 65,536 shader instructions to be carried out in a pipeline, with 24 pipelines working simultaneously.

These pipelines can be manipulated to do general processing if a program can send through a big stream of data to be processed, and represent data (customer details in a database, for instance) as graphical geometry — pixels and triangles. If that sounds tricky, it is. Programmers lament that while there is huge potential in GPGPU (General Purpose computation on GPUs) programming, actually doing it is very tedious.

A new effort in making GPUs accessible to programmers is a language called BrookGPU. It allows developers to program in a C-like language, handling many of the deeply technical aspects of sending streams of data to the CPU at a compiler level. It's still in its early stages, with Brook's online forums bubbling with questions like "having problems with double precision?" and "upload > processing > download: sequential or parallel?". But there's no lack of interest in the project.

In what is more an example of good timing than good planning, GPGPU programming has become viable thanks to the development of Intel's new PCI Express system bus. This technology allows information to flow back from the video card as fast as it flows in.

The previous system bus standard for video cards, AGP, had highly unbalanced communication channels. Data would flow into a card at 1.8GB/s but could only flow back out at 266MB/s. Since the system bus

David versus Goliath

	NVIDIA	Intel
Employees	2,101	85,000
R&D spend 2004	\$335 million	\$4.8 billion
Revenue 2004	\$2 billion	\$34.2 billion
Profit 2004	\$649.5 million	\$19.8 billion
Revenue 2002	\$1.4 billion	\$26.8 billion
Profit 2002	\$519 million	\$13.5 billion

was designed purely for graphics, there was never a perceived need for rendered graphics to go anywhere other than out the back of the video card and into the monitor cable.

This was a choking point for general purpose GPU computing, which needed to get data back from the video card as fast as it could process it. PCI Express offers a "dual carriageway" to and from the video card, allowing data to be transferred at 4GB/s each way, for 8GB/s of total bandwidth.

As consumers buy more computers based on PCI Express technology, the incentive will become ever greater for developers to take advantage of the untapped GPU power to supplement what's available from the CPU.

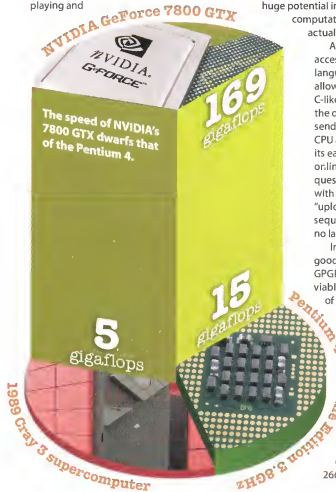
PROOF OF CONCEPT

Although there's no lack of research projects to have demonstrated GPGPU programming techniques for niche computing tasks such as fluid modelling and radiology imaging, the first commercial program to use GPGPU programming techniques is BionixFX. This dramatically accelerates multitrack sound editing by representing audio as video and passing it through the GPU.

"If you spent \$25,000 on a proprietary studio DSP solution, you're probably happy as a clam and don't care about this technology," says BionixFX's maker on its Web site. "For everyone else trying to make music on a PC with more than a few tracks and effects plugins... you are well aware of the frustration of never having enough processing power."

The software isolates audio samples from the multitrack audio stream and converts them into what appears to the graphics card as video data. BionixFX sets up pixel shader programs on the GPU to process the "video" data and additional audio samples are loaded in as video textures. The GPU then processes what it thinks is in-game graphics data.

The final graphic output goes to off-screen video buffers, ready to be output to a monitor. At this point, however, BionixFX intercepts the data and retrieves it back into the computer's main memory as fully processed sound.



An early advocate of the software is Ed Lima, composer and sound producer for Doom 3. "This technology is revolutionary," he said. "The game audio guys are really going to jump on this, cause we all have US\$500 video cards to test our work on, but they're useless to us during content creation."

Intel is sour about speed comparisons being made between its CPUs and video card GPUs. "Why does [APC] want the numbers?" asked a US-based Intel PR spokesperson, cautioning about comparing apples with oranges. However, John Owens, a professor at the University of California, thinks an industry-changing conflict between GPU and CPU manufacturers is inevitable. The question he poses is this: is the core of future computer systems the CPU, a CPU with an inbuilt GPU, or a GPU being used as a CPU?

While NVIDIA's Jen Hsun-Huang is now more careful about offending Intel, he hasn't always been so shy about the potential of GPUs to eclipse CPU performance. Though

Intel is sour about speed comparisons being made between its CPUs and video card GPUs

Intel has traditionally operated on the "Moore's Law" assumption that the number of transistors on processors will double every two years, Huang has moved beyond that. "NVIDIA's core

strategy is to deliver a breakthrough product every six months, doubling performance with each generation at a rate of essentially Moore's Law cubed," he told journalists in 2000. "Our unique ability to innovate at this staggering pace is one of the key elements of our competitive advantage."

Despite the company's recent political posturing, NVIDIA isn't holding back on GPGPU computing. It is on the brink of moving part of its massive internal server farm to run computationally intensive jobs on GPUs. Currently, it uses a 10,000 square foot Linux server farm in its company HQ to process silicon modelling jobs from its chip engineers.

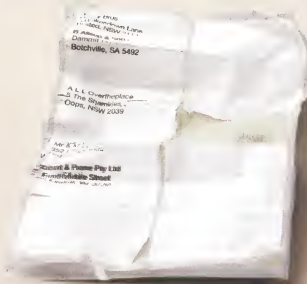
Inside info

- GPGPU project page www.gpgpu.org
- Learn the basics of GPGPU programming www.gpgpu.org/developer
- BrookGPU programming language <http://graphics.stanford.edu/projects/brookgpu>
- BionixFX GPU audio accelerator www.blonixfx.com

It is adding 1,000 CPUs a month to keep up with demand, at a cost of about US\$24 million per year. But this cost may soon be mitigated by the company's use of its own technology.

"Wouldn't it be fabulous for NVIDIA chips to be designed on NVIDIA chips?" mused the company's IT manager Ed Yee. No more details were forthcoming — press minders were lurking in the background — but Yee glanced at a large pallet of blade servers sitting retired outside the server room, wrapped in oversized scads of cling film. The look said it all: watch out Intel, the next big hit in computing just might be Attack of the Killer GPUs. **CTG**

Dan Warrne travelled to San Jose as a guest of NVIDIA



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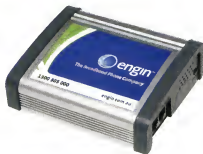
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Deciphering mobile data deals

Internet-on-the-go is increasingly affordable but, as **Angus Kidman** discovers, knowing some industry tricks can get you a better deal.

On the Net overseas

The ultimate mobility challenge is to get live data access on a moving plane. Concerns over security and interference mean that most airlines ban the use of Wi-Fi networks, but a number of airlines have implemented the Connexion system from Boeing to allow wired access in the air.

The maximum data speed is around 5Mbit/s, though that has to be shared between all the passengers using the service. It's a good idea, but not a cheap one: both Singapore Airlines and Lufthansa charge up to US\$29.95 for unlimited access on a long haul flight.

If you travel abroad and want to access your email through your phone, ensure the roaming agreement also includes data. Double-check the rates charged by the international networks too. Like roaming phone calls, prices are often inflated and can vary between networks in the same country.

Alternatively, try wireless hotspots. Existing plans from Telstra and Optus offer roaming options, but the prices are astronomical. Boingo (www.boingo.com), with its fixed monthly rate and more than 300 local hotspots (18,000 worldwide), is a more cost-conscious option. However, premium locations such as Australian airports are all tied up with premium providers like Optus and Telstra.

Once you're addicted to living your life online, it's natural to want Internet access everywhere. The ability to get online anywhere also offers more practical benefits, such as checking movie times when you're out on the town or monitoring a security camera in your house.

In theory, there are a range of options available to the budding mobile data user. If you've got a mobile phone, you can either access the Internet directly or connect it to a PC for access using the near ubiquitous (but painfully slow) GPRS network. For higher speeds, you could try a 3G network (currently only available from 3, but due soon from other providers), or one of the specialised providers such as Unwired or iBurst/PBA (though these have limited national coverage).

The biggest challenge for the consumer user of mobile data is pricing. Primarily designed for business users, most plans come in at \$150 per month or more. It's a particular problem with Telstra's new high-speed EV-DO service operating through its CDMA network.

One way to minimise costs is to use a capped mobile plan with a fixed monthly charge. Make sure the plan includes data — all plans from 3 and Vodafone do, but Optus only offers one, the \$49 "capped plus push to talk" plan. Telstra doesn't have any capped plans which include data. Bear in mind that even if your plan includes \$500 worth of usage, that won't amount to much at the \$20 to \$22/MB rate most mobile networks charge for GPRS.

Additional hardware charges apply if you want to access the Web or email via a PC rather than your phone. PCMCIA adaptors which connect your notebook to the Net via GPRS generally cost upwards of \$300 but, like mobiles, can be obtained more cheaply if you sign up to a service contract as well.

Cables to connect a phone to your notebook are also ridiculously pricey. Using a Bluetooth-enabled notebook and phone is the cheapest way to link the two. Bluetooth USB adaptors can

usually be found for less than a mobile phone cable (such as the HP Bluetooth USB transceiver for \$28 from <http://instantint.com.au>).

GOT IT COVERED?

Mobile data's business orientation is further reflected in the locations where these services are deployed, especially if you want more than GPRS speed. Major hotspot operators have coverage at airports, but fewer have it in shopping centres and cafes. Mobile broadband network Unwired's services are only available in Sydney, while iBurst is restricted to Sydney, Brisbane, Melbourne and Canberra.

Whichever platform and technology you select, check the fine print. Many providers have a minimum charge or flag fall, which can lessen the value of low per-kilobyte data rates. This is particularly ironic given that most mobile data services are designed to be "always on".

Telco 3's data charges go up from \$1/MB to \$4/MB if you roam off the 3G network and onto its partner Telstra's GPRS system, even though the access speed will be dramatically slower. This can even happen inside areas of 3's own coverage.

Good value deals, such as Optus' flagfall-free, pay-as-you-go Wireless Internet GPRS plan at \$5.50/MB, are not heavily promoted.

Despite the high prices, sensible usage habits can also minimise costs. If possible, set your mail client software to only download headers, to view

Sample mobile options

Provider	Technology	Coverage	Hardware required	Real world speed
3	3G	Nationwide	3G USIM plus phone or mobile cable	300kbit/s (in 3G coverage areas)
Telstra	1xRTT/EV-DO	Nationwide	PCMCIA or USB	300-500kbit/s
Optus	GPRS	Nationwide	SIM plus phone or mobile cable	40kbit/s
Vodafone	GPRS	Nationwide	SIM plus phone or mobile cable	40kbit/s
iBurst	Proprietary	Sydney, Brisbane, Melbourne, Canberra	PCMCIA	\$12kbit/s to 1Mbit/s (dependent on plan)
Unwired	Proprietary	Sydney	Custom modem (no PCMCIA card option)	64Kbit/s to 1Mbit/s (dependent on plan)

all messages in text mode, and ignore any attachments. Minimise subscriptions to bandwidth-busting mailing lists, and choose a mail provider with a decent antispam policy.

BEST DEALS

Budget deal: if you want to use an existing GSM handset, don't want to commit to a monthly plan, and don't need high speeds, Optus' Wireless Internet Plan is by far the best deal with its .55c/KB rate — that's \$5.50/MB, compared to the roughly \$20 to \$22/MB charged by Telstra and Vodafone for their pay-as-you-go GPRS. Don't get sucked into the more expensive Optus Zoo plan (2.2c/MB). If you want a capped deal, 3 and Vodafone offer reasonably good packages. **Roaming deal:** if you're a more regular and heavier user, coverage is an important issue and you're unlikely to be satisfied with slower-than-dialup GPRS speeds.

Even though Telstra's 144-500Kbit/s CDMA-based 1xRTT/EV-DO network has the best national coverage, its prices can't be justified outside a business context.

The \$20 mobile broadband plan offered by 3 is the best bet, provided you stay within the limits of the CBD. You get \$100 of usage on the 3G network, charged at \$1/MB. But beware: if you roam to GPRS (which can happen even in 3G coverage areas), you'll be charged at \$4/MB and no cap is applied.

Bulk deal: if you're after a high download limit but balk at business rates, your location will heavily influence your choice.

East coast consumers should check out iBurst, which is the only option to offer shaped speeds when you exceed download limits rather than charging you for the extra downloads. The service is available in a variety of configurations from around a dozen providers, so look around for the best deal. However, you'll have to shell out for a pricey iBurst laptop card — typically \$295, plus \$100 account setup. The best option for WA users is the 3 plan above. **ETB**

Hard choices

While the biggest long-term cost for mobile data users comes from access charges, you'll need to lay out a fair wad of cash up-front to get access. What are your options and just how much will you spend?

Budget GPRS handset

If you aren't concerned about speed, any low-priced GPRS-capable mobile will do.

Product	Nokia 5140
Price	\$0 upfront, then 24 monthly payments of (\$25)
Supplier	Strathfield (www.strathfield.com.au)



Budget 3G handset

While high-end 3G phones are often costly, getting access to high-speed data needn't cost a fortune.

Product	NEC e313
Price	\$95 (prepaid only)
Supplier	3 (www.three.com.au)



Full screen handset

Recent model phones with built-in email clients can download your email from your regular mail server — no need for a pricey BlackBerry service. You generally can't read the attachments though.

Product	Nokia 3120i
Price	\$0 upfront on \$25 plan
Supplier	Optus (www.optus.com.au)



Mobile email handsets

If you need email all the time, there are a range of options available. BlackBerry remains the most visible option, but there's a selection of other devices available from different suppliers. None are cheap, so give them a test run before committing.



Product	Optus BlackBerry 7100g
Price	\$480 on 24-month contract, \$99 capped plan (50MB data plus \$500 calls)
Supplier	Optus (www.optus.com.au)



Product	Telstra i-mate PDA2k 1x EV-DO
Price	\$0 on 24-month contract, \$99 plan (100MB data)
Supplier	Telstra (www.telstra.com.au)



Product	Motorola A1000
Price	\$979
Supplier	3 (www.three.com.au)

PC hardware

Plugging in a USB or PC Card modem can instantly give your laptop access to mobile data. Prices in this category vary hugely, depending on the underlying technology — unfortunately, in most cases you won't be offered much in the way of alternatives.

Product	Maxon MiniMax Modem
Price	\$0 upfront on \$49 per month or greater plan (20 hours' usage)
Supplier	Telstra (www.telstra.com.au)



Product	NetConnect card
Price	\$0 upfront on 24-month contract; \$49 usage in 3 video zones
Supplier	3 (www.three.com.au)



Product	Mobile Connect Card
Price	\$299 and any plan
Supplier	Vodafone (www.vodafone.com.au)



Bargain options

If you're really strapped for cash and you already own a notebook, it's still possible to get into mobile data without spending a fortune.

Some well-directed hunting on eBay can turn up a second-hand PCMCIA GPRS card for just a few dollars — a bargain, even with high postage rates, considering they're essentially mobile phones in a card. Just make sure you get a tri-band card because some sold in the US will only work on the GSM1900 frequency that Australia doesn't use.

The same principle applies to the data cables for existing mobiles. Retail prices for Nokia's cables can top \$90, for instance, but you can easily get generic versions from eBay for under \$20.



Low commitment plan	High volume plan
Casual use (.4c/KB)	\$99 Mobile Broadband Cap (\$500 Videozone usage)
Pay As You Go (.2c/KB, 20c minimum)	Data Pack, \$149 (500MB cap)
Wireless Internet Plan (.55c/KB)	\$99 BlackBerry Cap (\$500 data plus \$500 calls)
\$49 Maxi Cap Prepay (GPRS charge .2c/KB, 30c minimum)	\$49.95/month Data Bundle (unlimited usage, 500MB soft limit)
QEmail Mobile Starter, \$49.95/month (\$12/128 Kbit/s, 300MB cap)	Wired Sky, \$64.95/month (1,024/345Kbit/s, 500MB cap)
Switch On, \$15.95/month (64/32Kbit/s, 200MB cap)	Break Free, \$39.95/mth (256/64Kbit/s, 168 cap)

Credit where it's due

One reader's Skype credit vanished due to what the company says was a rare error with its billing system.

Dear Watchdog,
I recently purchased calling credit with Internet telephone company Skype that allowed me to make calls to landlines anywhere in the world at reduced cost. This seemed a good idea since my partner is from Queensland and calls her friends weekly — and would call more if it weren't for the large telephone bills we already receive.

A few days after installing the program and using it to make a limited number of calls, I had an issue with my PC which ultimately required me to reformat my hard drive. Unfortunately, my Skype username and password went with all the rest of my data.

I contacted Skype's support department with this dilemma and received an email from the support staff asking for more information. They asked for the date I paid, the type of credit card used, the first four and last four digits of my credit card number, my name and my email address. I supplied all of these details by return email, only to receive another email asking whether this was actually that credit card used, as they could not locate any information.

I replied confirming that this was the credit card used and provided the first and

last four digits once again, only to receive an email asking for the entire credit card details. Both my partner and I thought this was not really acceptable. I contacted my bank and was advised not to provide the whole credit card number by email.

By the look of things, I have lost my money from my first Skype credit purchase. As such, I would not use this company again and will be warning everyone I know that this could happen to them.

**Patrick Lanigan
Bussefont, WA**

Watchdog invited Skype Communications to investigate Lanigan's complaint about the apparent loss of his details.

Dear Watchdog,

We have looked into Mr Lanigan's case. Our customer service agent was indeed unable to find the details and had to request more details in order to attempt to help.

Since the escalation of this case within our system, we involved our software suppliers, and found a rare issue within the system we use for registering our users' details. This software bug meant that the customer service



One reader was so devastated by his "lost" Skype credit that he simply began shredding his credit cards.

agents were unable to locate details of user names with a certain format.

We have now corrected this error so that other users of Skype will not be affected and we have brought Mr Lanigan's account into order again. I have also written a letter to Mr Lanigan explaining the situation and that we have now rectified it.

We always appreciate our customers' feedback. It is invaluable and helps us to improve our systems and customer services as we continue to grow along with our user base.

**Michael Jackson
director of paid services
Skype Communications**

Lanigan contacted Watchdog again to let us know that Skype had indeed contacted him directly and offered him some free

Claim your \$9 from Quicken while it's hot

After more than two years of charging its customers \$9 each time they needed to activate their software, Quicken has finally reversed its position on the maligned fee following intervention by the ACCC. The company will now refund all re-registration fees paid by customers.

Dear Watchdog,

In 2003, APC published an article regarding a \$9 re-registration fee payable by QuickBooks or Quicken Personal customers wishing to re-install Quicken products on a new or repaired PC (APC June 2003, page 30).

The \$9 charge, designed to minimise piracy by verifying that such re-registrations complied with licence terms of Quicken software (most versions of QuickBooks and Quicken Personal are licensed for single use on one computer only), was introduced around 11 March 2003.

Some customers contacted the Australian Competition and Consumer Commission (ACCC) to complain about the introduction of that charge. We cooperated with the ACCC's investigation of these complaints. The ACCC was concerned that the imposition of the re-registration fee was not made clear prior to the purchase of our product.

In order to resolve the issue we have updated the product packaging and have also agreed to offer a refund to those customers who paid the charge to re-register Quicken Personal (versions 2004 and older) and QuickBooks (versions 2003 and older).

In recognition of any inconvenience caused to customers and because of the effort required to claim the \$9 refund, I am also offering affected customers a discount of five times that amount off the cost of an upgrade to the latest version of their software. This offer includes free Advantage

membership for the first year. If an affected customer is already using the latest version, he/she can take advantage of this offer upon release of the next upgrade.

Any APC readers who believe they are entitled to the \$9 refund and \$45 upgrade discount can claim by visiting www.quicken.com.au/9Dollarrefund.aspx before the end of September 2005.

Quicken Australia has also implemented a secure online system to manage future re-registrations to ensure customers can re-register software without incurring additional charges. Should any of your readers have any queries regarding this, they should not hesitate to contact us on customerservice@quicken.com.au or by phoning 1300 784 253.

**Greg Wilkinson
CEO and founder
Quicken Australia**



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Seagate Pocket Drive



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WARRANTY CLAIM IN SPAIN MAINLY A PAIN

I recently purchased an HP portable printer for use while working away from home (Wellard, WA). One of the key criteria for me was HP's international warranty, as the company has a reputation for good after-sales service. However, where I am currently working (Spain), I've found the international warranty to be worthless despite the best efforts of my original supplier in Perth.

I first purchased this model of printer in November last year. By February, it had broken and HP offered a replacement. I could not accept the first replacement delivered as it was three years old, scratched, and judging by the print history had been heavily used. My present printer — the third, and just six weeks old — failed three days after I arrived here in Spain, having printed less than 50 pages.

I have been trying to get it repaired or replaced ever since. The loose parts shaken

from the printer and the broken plastic below the black ink cartridge make it obvious that either faulty materials or a weak design have caused the jammed components to foul each other and break.

My first contact was the phone number Hewlett-Packard advertised for service in Spain, which was a recorded message in Spanish. HP Australia could only offer a telephone number in Spain where English is spoken, so I used that. As soon as the words "repair and replacement" were heard, perfect English became broken English, then full Spanish, then the representative hung up.

HP Australia insisted I return the unit to them. This is neither a reasonable nor viable demand given that the postage one way is 101 (\$181) plus packing. For me to approach the problem from a legal viewpoint, it is the supplier, Commander WA, I must demand a replacement from, or a full refund, when to be fair they have been very helpful. The cause of this problem is really HP, not Commander.

Have any other Australians experienced problems of this nature when temporarily working in Europe, or with the HP Deskjet 450cbi printer breaking up?

Barry Clarke
Wellard, WA/Spain

Watchdog asked why it had been so hard for Clarke to claim in Spain under HP's international warranty, and requested that HP Australia prioritise resolving his claim.

Dear Watchdog,
Our support team has made contact with this customer and his issue has been resolved. He

will receive a new Deskjet unit. HP has not experienced any issues like this previously with the HP Deskjet 450cbi.

HP's Limited Warranty Statement is valid in any country where the covered HP product is distributed by HP. Contracts for additional warranty services, such as onsite service, are available from any authorised HP service facility where the product is distributed by HP, or by an authorised importer.

Jacqueline Ibrahim
Hewlett-Packard Australia

Watchdog asked for clarification: was the HP Deskjet 450cbi distributed in Spain? Ibrahim confirmed that it was, leaving us to ponder our original question — why did Clarke get the runaround?

We asked HP what customers should do to ensure their international warranty claims are processed smoothly.

Dear Watchdog,
I think this can be summarised as a language communication problem, not a process or warranty issue. When we [HP Australia] got involved, the customer received a new unit and an apology from HP.

HP does not have a worldwide helpline because what language would it be in? If this customer had a Spanish-speaking colleague or friend to place a second call, or to go on to the HP Web site to initiate a chat session in English, there would not have been an issue. In this case, we delivered above the warranty terms by supplying the new unit.

Jacqueline Ibrahim
Hewlett-Packard Australia

Contact us

WE WANT TO KNOW

how IT companies are really treating you. Write to watchdog@apcmag.com. Letters must be under 250 words and include your full name, B/H phone number (mobile preferred) and your address. If your complaint is about a specific purchase, include the retailer's details including an invoice number where possible. Letters become the property of APC and are subject to editing.

Pin the blame on the distributor

When David Kemp of Port Macquarie, NSW, tried to get his faulty Lite-On DVD burner replaced under warranty, it took an astonishing 103 days for his online retailer, GameDude in Queensland, to provide him with a replacement unit. This was despite Kemp's repeated phone call follow-ups.

GameDude manager Dorian Bussenis told APC, in part: "The problem is not with us, it's with the distributor, Synnex. We have been complaining to them for nearly two years about the appalling time it takes to process a warranty."

"The facts are that we were being honest when we said it was still with the



The blame game played by retailers and suppliers is a real pain in the ass.

supplier, and most complaints about return merchandise authority [RMA] turnaround are because of Synnex," Bussenis continued. "My final fix to this problem has been to stop dealing with them and move to more reliable suppliers of the same products."

We put GameDude's claims to Synnex. Service manager Anthony Ho responded, in part: "Return authorisation (RA) forms that were submitted [by GameDude] mostly didn't have sufficient information for us to issue the RA number. In the past, we contacted GameDude to get more information, but

they were often quite rude to Synnex staff."

The issue of replacement times for faulty hardware continues to be a fraught issue in the industry.

However, it's important to remember that it's not your problem if the retailer has issues with their distributor. The contract of sale is between the end customer and retailer, and if the product becomes faulty, the retailer must remedy the breach of contract by repairing, exchanging or refunding the product.

If you are unhappy with an exchange or repair, you are entitled to a refund at any time within the limits of the faulty product's warranty period. In the event of a dispute, consumers should complain to their state's office of fair trading so that the retailer can be reminded of its legal obligations.

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Getting analog video into your digital network

Most video and sound in your home exists in analog format — in your TV, VCR or old analog camcorder. To be displayed or listened to via digital devices, it must first be converted into digital format. This is where another key device in a digital home setup comes in: the analog-to-DV converter.



VCR: tape or TV signal

1 Analog data goes into composite video (RCA) or S-Video jacks of an analog-to-DV converter.

A/V converter

2 Chips convert video and audio and compress to MPEG-1/2/4 or other digital data formats.

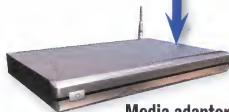
3 The digitally formatted data is sent to a PC or other device equipped with USB or FireWire ports.



Analog camcorder



DVD/CD burner



Media adaptor



Television

D-Link & APC digital home competition

D-Link is offering APC readers the chance to win a D-Link DUB-AV300 Audio/Video Grabber, as featured in the Study Room (see right). The DUB-AV300 is a high-speed video display and capture device that provides a powerful interface between your PC and your analog camera, camcorder or VCR. All you have to do is email APC at competition@apc-mag.com and tell us in 200 words or less why you want to watch old video tapes on a digital setup. Entries close midnight (AEST) 13 September 2005, and the winner will be announced in the November issue of APC.

dlink.com.au
Internet

D-Link Digital Home Networking

STUDY

DSL-G604T
D-Link ADSL2/2+
Modem & Wireless
Router Combo



DWL-G430
D-Link USB
Wireless Adapter

Desktop Media PC

BEDROOM

Surround
Speakers



DWL-G630
D-Link Wireless LAN
Cardbus Adapter

Notebook Computer

LOUNGE

DSM-320
D-Link Wireless Media Player

DVC-1000
D-Link Video
Confidential Camera

DWL-G810
D-Link Ethernet
to Wireless Adapter

7-5300
7.1 Channel
Surround
Speakers

Large Format
LCD TV

See APC August 05



RUMPUS

Surround
Speakers



DWL-G810
D-Link
Gaming Adapter

Gaming Console

Cordless
Controllers

D-Link
Building Networks for People

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2005

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D-Link Digital Home Networking

Wirelessly connect your study to your digital home network, and start experiencing the benefits of the D-Link digital lifestyle.

DSL-G604T

Modem and Wireless Router Combo

The DSL-G604T is an ADSL Router designed for home or office use. It lets you quickly and easily connect to high-speed broadband Internet and share your ADSL line. An ADSL modem is built-in, making connection to the Internet a breeze. The

router also incorporates four 10/100Mbps Ethernet switch ports, providing ready connection for workstations and servers.

DUB-AV300

Audio/Video Converter

The DUB-AV300 is a high-speed video-displaying and capturing device that provides a powerful interface between your PC

and your analog camera, camcorder or VCR. It allows you to use your analog camera to carry out video conference, video mail, surveillance and periodic or long-time recording from your PC. Using resolutions as high as 720 x 480 pixels, the device converts your analog data (video and sound) and compresses it

to MPEG1/2/4 or various other digital data formats,

DWL-G120

D-Link USB Wireless Adapter

The DWL-G120 is a powerful USB 2.0 adapter that installs quickly and easily into any desktop or laptop PCs with an available USB port. Like all D-Link wireless

adapters, the DWL-G120 can be used in Ad-Hoc mode to connect directly with other 802.11g or 802.11b wireless enabled computers for peer-to-peer file sharing. In Infrastructure mode it can connect with a wireless access point or router for access to the Internet in your office or home network.

STUDY



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- Connect a D-Link Router to either a DSL or cable modem
- Connect a D-Link Router to either a DSL or cable modem
- Configure file sharing
- Perform standard testing



Extras Pack

DIS-102

This package is ideal for a network that needs more than 2 computers networked and/or extra printers, wireless or wired routers, videophone or a gaming console to be added.

- Connect an additional PC (Desktop and/or laptop)
- Or connect an additional printer
- Or connect a D-Link Wireless Access Point or Router
- Or connect a D-Link Internet Video Camera or VideoPhone
- Or connect a gaming console



Future Pack

DIS-103

This package would suit the smallhome/office that would need additional devices in the future.

- Connect an additional PC (Desktop and/or laptop)
- Or connect an additional printer
- Or connect a D-Link Wireless Access Point or Router
- Or connect a D-Link Internet Video Camera or VideoPhone

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Would the real HTPC please stand up?

The public hasn't warmed to paying \$4,000 for a tarted-up VCR in the form of a media centre PC, but that's about to change.

Despite the saccharine, middle-American family marketing we've had to gag on at various points in the digital home marketing spree, there hasn't actually been a lot of movement in the Australian corner of the market.

First, we missed out on the whole TiVo revolution that sparked the media centre scramble in the first place. Then we got shafted when Microsoft released Windows XP Media Center Edition (MCE) without the Electronic Program Guide that gives the operating system its heart and soul.

As it stands, there's little reason to blow several grand on a media centre PC. About the only thing it can offer the living room over a cheaper dedicated consumer electronics device like a hard disk recorder is increased storage capacity. There is no killer app yet, no compelling reason for the great unwashed to shoehorn a computing device into their home entertainment setup.

Microsoft and Sony both aim to change this situation with their next-generation gaming consoles, unveiled to an orgy of gushing fans at the E3 games expo in May.

Both companies were keen to reinforce that this time, it's not just about the games. It's a sentiment evident in the wishy-washy justification for the Xbox 360 name — that the console makes you the centre of the digital media experience. It's also evident in the way Sony refers to the PlayStation 3 (PS3) as a home entertainment computer.

Behind the marketing bluster lie some seriously cool things though, things that make these consoles into strong contenders for the killer digital home app.

As the veil came off Sony's PS3 console, it wasn't the eerie physical similarity to a George Foreman Grill that struck me, it was the fact the console sports slots for reading data stored on not only Sony's proprietary Memory Stick media, but also non-Sony formats — CompactFlash and SD. It also features several Ethernet ports to plug into home networks. (More recent comments from Sony indicate that it has dropped the ability to function as a router.)

PlayStation 3 is also going to be the first widespread application of the Blu-ray storage format. Much like the PlayStation 2 bore a lot

of responsibility for driving DVD into the mass market, Sony is using the PlayStation 3 to kickstart Blu-ray as the format for the next generation of DVD, and hopefully win the war against the rival HD-DVD format.

As for Microsoft, its Xbox 360 console is very much a digital entertainment hub. Besides the obvious game functions, the Xbox 360 is capable of connecting via a network to a Windows XP MCE PC to stream television, video, audio and images. It's also capable of connecting to digital cameras and MP3 players via USB to grab media to store on its 20GB hard drive.

PS3 and Xbox 360 are strong contenders for killer digital home app

Both consoles are also designed to support HD video formats. Xbox 360 can display games and images at both 720p and 1080i resolutions. The PS3 goes one better and supports 720p, 1080i and 1080p. Sony has even talked about what it calls "aging" video footage, where the Cell processor in the PS3 will use idle CPU time to upscale video stored on a network to HD resolutions.

Both the Xbox 360 and PS3 contain the latent processing power needed in the new age of HD video. Just how well this power is wielded will ultimately determine how many of the pre-launch claims are ultimately fulfilled.

Of course, we haven't actually seen these consoles in action yet, so questions remain over how useable and extensive the digital media functions of the products are. But it's going to be fascinating to see whether they can indeed be the first computing devices to deliver on the digital home ideal.

It looks like you're writing a monopoly



Guess what? It's time to upgrade all your Microsoft products. Again.

When you hear the words "Microsoft Office", what do you think of? Bloated? Expensive? A necessary evil? Are you excited at the prospect of upgrading to the latest "lick of paint" version? I thought not. But despite being dogged by these perceptions, Microsoft has no intentions of giving customers a break from the upgrade cycle.

Office 12 will go to beta some time before December 2005 and ship in late 2006. That is pretty much all Microsoft will say publicly — and that Office 12 will have native XML file formats. Yawn. There might also be a new charting application which will be as fully-blown as Excel or PowerPoint.

But new features aren't the company's main focus. It is attempting to turn Office into the de facto interface for nearly all Microsoft and many third-party applications. Think IE and the Web... with no viable competitors.

Microsoft is integrating Office more and more tightly with a raft of business applications such as high-end accounting programs. It's also a given that Office will be the front-end for the rapidly expanding set of Office servers — Excel Calculation Server, InfoPath Forms Server, and so on. The aim is for no company to be able to compete with the total "Office System" offered by Microsoft

— a kind of giant-sized version of the iPod and the iTunes Music Store.

Industry-specific versions of Office are in the works, too — Office for Call Centers, Office for Sales, and so on. There's already an Office for Small Business Managers (complete with a built-in accounting product) due to ship before the end of this year. There will even be Microsoft Student 2006, which adds a bundle of educational resources, plus Encarta, to the suite. That's set for July next year.

Meanwhile, Microsoft is doing its darndest to convince software developers that Office is a platform atop which they can and should build their applications, just like they do on top of Windows today. Microsoft is developing new tools to make it easier for programmers to use Visual Basic and C# to write custom apps based on Word, Excel, InfoPath and Outlook.

I think these ingenious and dastardly strategies will certainly cement Microsoft's market share, and you'd expect no less from a company that has perfected the use of its monopoly power over the years.

Mary Jo Foley is the editor of *Microsoft Watch* (www.microsoft-watch.com). She sounds off exclusively for APC on Windows each month.



Mary Jo Foley

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Redmond not always the villain

We love to blame the big guy, but one reader argues that Microsoft isn't to blame for all the problems in Windows.

Aaron Bond (*APC* June, page 28) blames Microsoft for basic flaws in Windows. However, the majority of his problems are not Microsoft's fault.

The Windows Installer service is quite solid at cleaning up during an uninstall. Sometimes files can't be removed because they are in use, in which case developers can queue up a task during system boot to have them removed.

Many developers choose not to use the Microsoft Installer, and opt for third-party installers instead. These do tend to leave files dotted everywhere, but Microsoft can't force people to use their installer without being branded "anti-competitive".

Regarding driver installation, the only times drivers have to be installed before a device is plugged in is if the hardware manufacturer wants to add a whole bunch of bells and whistles. If devices just use Windows' INF files, you can plug the hardware in and let the hardware wizard find the driver.

The user interface issues Bond talks about have already been addressed by Microsoft. If Quick Launch has too many icons for your

taskbar, just undock it and put it on the edge of your screen. (To do this, minimise all your programs, right-click on the taskbar and ensure it is unlocked, then drag the Quick Launch bar onto the desktop. It will appear as a floating window. Then drag that window to the side of your screen to "dock" it on the edge of the screen.)

If you want to hang on to your screen real estate, you can right-click on the Quick Launch bar and set it to auto-hide and be "always on top". You can even make it look more like the Mac OS X Dock if you like by right-clicking and selecting "large icons".

As for the system tray, Windows XP lets you hide icons so only the ones you want to see are constantly visible. This is done through the taskbar properties. As for not being able to permanently get rid of them, this is due to third-party developers abusing the Windows Registry to start applications on boot rather than using the StartUp folder.

However, spending five seconds with msconfig.exe (present in Windows 9x and XP, and available for download in Windows 2000)

A lot of the Windows problems blamed on Microsoft are actually caused by third-party developers.

will permanently remove any applications from starting up.

Alan Li
Gordon, NSW

OPEN DOOR FOR VIRUSES

It was a breath of fresh air to read Aaron Bond's letter (*APC* June, page 28). I would also like to add that the Windows XP installation literally invites viruses into your system.

After installation, Windows immediately requests that the user register over the Internet. That involves creating an Internet connection. But does Windows ship with antivirus? Nope.

Letter of the month: Time for Windows-on-a-card

With flash memory getting bigger, faster and cheaper, the industry should be looking closely at the concept of running the operating system off a memory card, with only user document files stored on a hard drive. Linux users are already doing this with bootable Linux distros on memory keys.

Why not build computers with a small memory slot on the front that accepts a bootable read-only card containing the operating system? The entire OS could be locked down with nothing able to write to it, except for updates that could be managed with strong protections (such as crypto-key authentication) from the operating system vendor's Web site.

To extend the idea, users could even have a second card with all their personal data stored on it, so their entire "PC" could be transported easily and run safely anywhere. With fast ADSL+ connections and encrypted online storage, these

document files could be automatically backed up to an off-site, online repository.

Imagine going to an online retailer and filling in a form and selecting which options you want on your PC. Windows XP? Check. Office 2003? Check. After placing your order you'd get a solid-state memory card delivered next day by courier. Boot, authenticate, all done.

For many users who find using a computer a daily wrestling match, this would bring the experience much closer to the consumer electronics model. Unlike today's PCs, upgrading Windows would mean simply slotting in a new card. And settings and files stored on another card or a hard drive wouldn't be placed at risk during the upgrade.

Of course, there are a hundred good reasons why this won't happen in the immediate future, many of them related to the way software, drivers, documents and

OS files are so inextricably intertwined under Windows. But it does seem to be the logical progression from where we are now, and something to head towards.

Bart Henrick
Latham, ACT

As Bart acknowledges, there are many practical hurdles to his idea. But we think Microsoft should pay attention to the concept. For his creative thinking, he wins a Logitech LX700 wireless keyboard and mouse set valued at \$199.



Therefore, Windows automatically makes itself vulnerable to Net-borne viruses and malware upon installation.

I'm not anti-Microsoft, but I believe in perfecting things. Perfection might be hard to achieve, but at least Microsoft could perfect the basics before adding more features.

Yvonne Myat Soe
Hurstville, NSW

PRACTICAL SOLUTIONS FOR ADSL

The Government should use its \$3,400 per person HiBIS [Higher Bandwidth Incentive Scheme] broadband subsidies to remove pair gain in towns that have an ADSL-enabled phone exchange, but are hampered by widespread use of pair gain units on phone lines. Currently, most of this money is being funnelled into subsidising satellite dishes.

In my own town of Dodges Ferry, Tasmania, the exchange was upgraded to ADSL in December 2004, but because the phone line to my house is pair gained, I cannot get ADSL.

HiBIS ISPs will gladly offer me satellite broadband, with an upfront cost of only \$99 (reduced thanks to the subsidy of \$3,400) with a commitment to \$69 per month for 18 months. Despite the subsidy, that is still expensive compared with ADSL services, and satellite services have poor latency which makes VoIP and remote screen sharing impossible. Ironically, Dodges Ferry is only 40km by road from the Hobart GPO.

By my calculations, two satellite subsidies at \$3,400 each, plus government administrative costs of, say, \$2,000, would free up [around] \$9,000, which would be enough to remove pair gain on sufficient lines for maybe more than half the town to get ADSL.

I hope my suggestion will be read and given serious consideration by the government. I have sent the suggestion to [the Minister for Communications, Technology and the Arts] Senator Coonan — perhaps other readers could too. The \$3,400 per person subsidy should be used to benefit more than just one household when pair gain is preventing people who live in ADSL-enabled towns from getting ADSL broadband.

Tracey Jones
Dodges Ferry, Tas

APC asked Telstra whether it would welcome Jones' idea if the government was prepared to budge on its HiBIS policy.

Telstra already claims a HiBIS subsidy for customers who had a pair gain system (PGS) upgraded to enable the provision of ADSL when they are connected to an exchange upgraded under HiBIS.

As part of the exchange upgrade, we include the cost of upgrading a number of

pair gain systems to ensure that a majority of customers can access ADSL. However, if a customer is connected to an exchange upgraded under HiBIS and is still unable to achieve an ADSL connection, there may be reasons other than PGS preventing provision of the service, or the PGS replacement may be very high cost.

We do capture information on demand levels by customers who were unable to connect to ADSL because they are on a PGS and factor that into investment planning.

The incentive payment for ADSL per customer is [actually] \$1,400 — the maximum \$3,400 is only available for the provision of broadband (usually satellite) in areas that can't access ISDN.

Rod Bruem
Corporate Affairs
Telstra

DRIVER DILEMMAS FOR 64-BIT WINDOWS

While Microsoft has now made an effort to join the 64-bit era by releasing its Windows XP Professional x64 Edition operating system, unfortunately the same thing cannot be said for hardware manufacturers.

Due to technical limitations, 32-bit device drivers cannot be successfully installed on the new operating system. This has caused many problems and inconveniences for users, sometimes restricting them from using some of their hardware or software that worked perfectly on the 32-bit version of the OS.

Perhaps an emulation utility is in order which would allow 32-bit drivers to be successfully installed on the new operating system? In many cases, users have contacted hardware or software manufacturers to request new drivers. Despite persistent user requests, many of these manufacturers have been unresponsive and unwilling to provide updates to their products.

By the looks of the current situation, it seems as though it will be a tough job for Microsoft to promote its new operating system when there are so many drivers that still need to be updated.

Michael Dimitriadis
Templestowe, Vic

DON'T BLAME LINUX

Frits Lancee says Linux isn't ready for desktop use because it doesn't have good support for USB modems (APC July, page 27).

The real problem is USB modem makers which don't make drivers for their devices for any operating system but Windows. Equal blame can be laid at the feet of ISPs who palm off these bargain basement devices to their customers as part of packaged deals simply to save a few dollars.

Ethernet-based modems are literally just a few dollars more in many cases than USB ones,

Agenda: Your place to vent

GIVE GRADUATES A CHANCE

After reading your article on the supposed skill shortage in IT (APC July, page 64), I can tell you that the industry could solve its problems overnight if it were willing to recruit more graduates.

After completing a degree in multimedia last year — and despite having a large folio and skills in the Macromedia and Adobe suites, plus coding skills in Java, PHP, MySQL, JavaScript and CSS — I get turned down for every application because I don't have enough experience. Most of my classmates have the same problem — only three out of 27 have found full-time employment.

I don't recall having ever seen a job ad that doesn't require at least two years in the industry. How does a person get experience if no one gives you a chance?

If IT recruiters could be a little more flexible, I'd happily take a lower salary for a job if I could get a break, and maybe in a year or two it can be reviewed. That's fine. Just someone give us a chance.

Tim Kynoch
East Hawthorn, Vic

and they don't need drivers, so they work with any computer and operating system.

To support USB modems, open source developers would have to have full access to the manufacturer's specifications, or go to the effort of reverse engineering the device. Unfortunately, this is unlikely to happen because Linux developers and enthusiasts simply use Ethernet modems.

A four-port Ethernet ADSL modem/router can be bought for well under \$100 and if your PC doesn't have built-in Ethernet, you can buy a PCI Ethernet card for \$10.

It's time for the industry to move on from USB modems. They're not just a problem for Linux — their reliance on drivers means they may not work with future versions of Windows, either. Just look at the lack of 64-bit Windows driver support.

Matt Carlsen
Bentley, WA

WHY BOTHER WITH MEDION?

I saw your review of the Medion Titanium MD 8386 computer (APC June, page 42). It looked like a value for money item so I followed up the contact provided — Medion Australia at www.medion.com.au.

There was a beautifully detailed page on this product, but the bad news was that it was only available through ALDI stores and not

► for release until 26 May 2005. Unfortunately, we do not have the luxury of an ALDI store in South Australia.

I contacted Medion direct to see if there were any other resellers in SA, only to be told that this item was exclusively distributed by ALDI. So I then contacted ALDI to enquire if I could arrange to purchase a unit and have someone pick it up for me from one of their Victorian stores (they don't ship interstate).

I was then told that this item was only one of its "weekly specials" and is now out of stock and ALDI did not know if or when it would be getting more.

Additionally, I was told to watch its weekly specials to see when or if the supermarket got any more in. It seems a poor way for Medion to try to sell its products if it does not have a regular and reliable distributor.

It is also a waste or both your and your readers' time in reviewing these items if they are not available as an off-the-shelf item.

Allan Suskin
Kent Town, SA

A BETTER BUDGET PC

In May's issue, you built a budget computer for under \$599 (APC May, page 86). My friend and I recently built a PC for \$654 that would beat the pants off the APC PC. Here are the parts and prices that I got from Umart Milton: case, \$49; ASUS 52/32/52x CD-RW, \$35; Intel 5478 Celeron 2.8GHz, \$135; Seagate 80GB HDD, \$90; keyboard and mouse, \$38; 2 x 256MB RAM DDR 400, \$35 per stick; LG 17in CRT monitor, \$148; Gigabyte 85661FXM-RZ P4 motherboard, \$69; floppy drive, \$20. Total: \$654.

I know it's \$55 over budget, but it's a great little machine. I think it's awesome that computers are so cheap these days and that people can buy them even if they don't have a large income.

Timothy Nakhla
Everton Park, Qld



Have your say

Add to these discussion threads or email your views (in fewer than 250 words) to epinions@apcmag.com.

All correspondence becomes the property of APC and is subject to editing. Letters sent to epinions@apcmag.com must include the writer's full name, suburb, state and phone number to be considered for print publication and to be in the running for Letter of the month prizes. Phone details will not be published.

I'LL TAKE FIVE!

I recently bought Half-Life 2 for PC and was astounded to discover the game could only be run on one PC because of the pathetic Steam program bundled with the game.

There are five computers in my household and if I'm going to spend \$90 to buy the game rather than pirating it like many other people, I'd like to be able to run it on all of them. Does Valve seriously think anyone will pay \$450 to run the game on five computers at home?

I don't blame people in the slightest for pirating software under these circumstances. Valve should let people use one serial code for a normal sized household of computers (five or six). It could still build in measures to ensure the game isn't pirated to five separate people by authenticating with a remote server and checking that the public IP address being used was the same one, or something like that.

Software companies need to start being a little more down-to-earth and realise that people are not going to pay astronomical fees for a second, third, fourth or fifth copy of every program they have already paid for.

Ben Anderson
Brisbane, Qld

HAMS BOIL OVER BPL

After reading about broadband over power lines (APC July, page 82), I question your judgment in raising the hopes of many people who can't access broadband easily. While the idea of BPL is great, it has a lot of problems.

You refer to the use of BPL in rural areas, but these are the areas where shortwave communications are most important. Interference from BPL systems on the shortwave bands can prevent or delay requests for emergency services.

There have been studies showing that interference from BPL test sites can be heard across most of the emergency services bands.

As a licensed amateur radio operator, or "ham", I also see this system as a partial death knell for our hobby. However, I don't consider what I do to be a hobby — it is a valuable community service. Amateur radio operators have been called in to assist emergency services in times of natural disaster.

During the 2002-2003 Victoria bushfires, amateur radio operators were called in to provide communications to assist in the fire fighting efforts. During the 2004 tsunami, it was amateur radio operators in some areas of Indonesia who got the first signal to Australia.

Andrew Weir
Wyndham Vale, Vic

The juice on ink costs

The controversy over colour printing costs in APC June 2005 (page 18) continues. We re-tested the printer with the highest cost per print, the Canon PIXMA iP2000, using the editor's own unit and a freshly bought set of ink cartridges. This time, using the same set of photos, we got over double the number of prints Canon's review unit produced — 77, compared to the 37 prints in the original run. Canon couldn't explain why our original review unit got such an uncharacteristic result but assured us it supplied new cartridges with its review printer and never uses "starter" cartridges with lower ink capacities.

But Canon's product manager, Ink printing, KC Lu, said even 77 prints isn't what he'd expect, as Canon's internal testing achieved 120 x 6 x 4 prints from one set of cartridges.

We repeated the test at APC a third time and got 74 prints, making the Canon iP2000's effective cost-per-print more like 87 cents. But your mileage may vary — as ours did on three occasions. The differing results achieved by both parties aren't unusual in printer testing. It points to an urgent need for printer vendors to agree to a standard set of performance and cost benchmarks for printers. This would also remove confusion for buyers.

Dan Warne

MORE ON PRINTER COSTS

In the SOHO colour laser printers Labs Challenge (APC July, page 58), it said "the OKI C3100, which uses an LED-based print engine, also has a fuser unit that will need replacing".

This could mislead readers into thinking that the other laser printers don't have fuser units that need replacing. In fact, all laser printers have a fuser unit and it is actually an advantage if it's user-replaceable, potentially saving upwards of \$100 in labour costs. OKI has realistically included the cost of the fuser as a consumable while other manufacturers have classed it as a "spare part" and not included it in their running costs.

Stephen Lakey
Rowville, Vic

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Detailed product reviews and comparisons

apc Labs Challenges

NEW LOOK!

At APC, we're always looking to improve the quality of information coming out of our test labs. This month, we've introduced a new format for the Labs Challenges. It enables us to focus on the criteria against which each product is tested and monitor how each product stacks up in every point of the test. This will give you a better idea of the strengths and weaknesses of the products throughout the comparison.



62 **Hardware Sub-\$5,000 small business servers**

Time for your small business to get its own server?
Nick Race compares seven sub-\$5,000 systems.



68 **Software DVD authoring**

Ashok Zaman burns through DVD authoring apps designed for varying levels of experience.

apc best value ranking



Each product in our Labs Challenges is rated according to its price/performance relative to the other products. This rank is a guide only, and is based on the prices given by the vendor. We always encourage you to shop around for the best possible price on an item.

apc Labs Reviews

- 42 Hardware NVIDIA GeForce 7800 GTX video card**
It's new, it's fast and it ain't cheap. *John Gillooly* mops up the drool after testing the latest video card from NVIDIA.
- 44 Hardware Dell 2405FPW 24in LCD monitor**
Dell's new 24in LCD monitor constructs a compelling argument for finally giving your ageing CRT the flick.
- 46 Hardware Compro VideoMate DVB-T300 tuner card**
Get analog now and HDTV digital later — all with the one card.
- 47 System Acer Ferrari 4005WLMi notebook**
As befits its name, this stylish thoroughbred is a real speed demon.
- 48 Hardware Philips 200W6 20.1in wide-screen LCD**
Big, clear and bright, Philips' wide-screen LCD has the right blend of performance and price.
- 48 Hardware Sapphire Hybrid X800 XL 512MB graphics card**
Is doubling onboard video RAM a quick performance boost or the next natural step for graphics cards?
- 50 System Shuttle XPC ST20G5**
Slender and shiny, Shuttle's XPC ST20G5 demonstrates real mainstream appeal.
- 50 Hardware Panasonic Lumix DMC-FZ5 digital SLR**
Are five megapixels a technological step backwards or an exercise in affordable photography?
- 52 Hardware HP Photosmart 8750 printer**
High-quality photo printing for under \$1,000.
- 52 System Toshiba Portégé R200 notebook**
It's thin, affordable, and an absolute stunner. We'll take one.
- 54 Software NeoOffice/J 1.1**
Office suites for Mac have traditionally been limited, but there's a new player on the field.
- 54 Software Microsoft Windows Server Update Service**
A powerful manager that makes downloading all those patches easy.
- 56 Software Ulead VideoStudio 9**
The latest version of Ulead's comprehensive, consumer-friendly video editing suite.
- 58 Best Buys**
Every month, APC compiles this guide to the hottest software and hardware products on the market.

NVIDIA GeForce 7800 GTX

It's new, it's fast and it ain't cheap. John Gillooly mops up the drool after testing the latest video card from NVIDIA.



Strictly speaking, the NVIDIA 7800 GTX is an upgrade, but it takes performance to a whole new level.

When a new product arrives in the APC Labs, its target market is assessed, tests are developed accordingly, and then some time is spent getting familiar with the product and its performance. But then a product arrives that gets swarmed upon and instantly installed. While a rare occurrence, this frenzy usually greets the appearance of a next-generation graphics card. That's because graphics hardware exemplifies the bleeding edge of technology, pushing the limits of semiconductor fabrication with incredibly complex circuits designed to render images at ever increasing resolutions and level of detail.

NVIDIA's GeForce 7800 GTX is such a product. This 300 million transistor GPU is the company's new flagship, based on 2004's GeForce 6800 architecture but highly tuned, tweaked and expanded.

In that sense, the 7800 GTX is more of an upgrade product, but it has maximised the performance gains of the architecture. To do so, the company has analysed the types of shader programs used in modern games to discover the most often used commands. Its engineers then optimised the shader hardware to work more efficiently with the more common operations.

This research has enabled NVIDIA to release a product which delivers much improved performance over the GeForce 6800 Ultra without major increases in operational frequency or memory bandwidth. The biggest change is the addition of eight new pixel shader pipelines to take the total number to 24. Along with the increased efficiency of

the pipelines themselves, the company has gambled on this combination to deliver the performance leap expected with a new generation.

THE NEW BREED
In essence, the graphics card industry is about

Benchmarks

3DMark05

1,024 x 768

GeForce 6800 Ultra	5,662	
GeForce 7800 GTX	7,281	9,000
GeForce 7800 GTX (SLI)	8,421	

1,920 x 1,200

GeForce 6800 Ultra	3,466	
GeForce 7800 GTX	5,299	9,000
GeForce 7800 GTX (SLI)	7,860	

1,920 x 1,200 — 4x anti-aliasing — 6x anisotropic

GeForce 6800 Ultra	N/A	
GeForce 7800 GTX	3,971	9,000
GeForce 7800 GTX (SLI)	6,403	

Half-Life 2

Test 1

GeForce 6800 Ultra	83.7	
GeForce 7800 GTX	100.02	150
GeForce 7800 GTX (SLI)	98.7	

Test 3

GeForce 6800 Ultra	131.17	
GeForce 7800 GTX	144.3	150
GeForce 7800 GTX (SLI)	139.45	

Test 4

GeForce 6800 Ultra	49.73	
GeForce 7800 GTX	84.43	150
GeForce 7800 GTX (SLI)	113.53	

marketing first and product second. It might be a close second, but recent years have suggested that the company which shouts the loudest is the one which reaps the largest profits.

Historically, a product has been announced, suitably praised on a pre-arranged launch date by a hand-selected group of hardware review Web sites, and then forgotten about for a few months while actual retail stock is built and shipped. This drives everyone from card manufacturers to consumers nuts, but thankfully the situation is slowly changing.

ATI and NVIDIA have tried to make the launch and retail availability simultaneous. With the GeForce 7800 GTX, NVIDIA has actually succeeded. There are already numerous brands of GeForce 7800 GTX on the market, and while the bundle and heatsink designs differ, the same hardware lies beneath. With this in mind, two NVIDIA GeForce 7800 GTX reference cards were tested.

A single GeForce 7800 GTX was assessed, as well as two cards running in SLI mode. This was done with a 3.46GHz Extreme Edition Pentium 4 CPU, 1GB of DDR2 533 RAM and an ASUS P5ND2-SLI Deluxe motherboard. For comparative purposes, the same tests were performed on a GeForce 6800 Ultra card.

Most of the testing was done at 1,920 x 1,200, a native resolution for 16:10 wide-screen monitors, which is high enough to ensure a noticeable difference between results. Tests on the previous generation of graphics hardware indicated that there will be little or no performance difference at resolutions like 1,024 x 768 or 1,280 x 1,024 unless

Details

Contact NVIDIA

Online www.nvidia.com

Price US\$599

Intended market Gamer/prosumer

✓ The fastest 3D graphics performance currently available; hardware WMV9 decoding support.

✗ Expensive.

Verdict ★★★★★

Specifications

	GeForce 7800 GTX	GeForce 6800 Ultra
Core speed	430MHz	400MHz
Transistor count	300 million	222 million
Pixel pipelines	24	16
Process technology	110nm	130nm
Memory speed	600MHz	550MHz
Memory bus	256-bit	256-bit
Memory capacity	256MB	256MB
Memory bandwidth	38.4	35.2
Interface	PCI Express	AGP

anti-aliasing and anisotropic filtering settings are used to maximise the load being placed on a video card.

This is also the reason why an Extreme Edition CPU, rather than a mainstream product, was used. Most current games are "CPU-bound" — a state in which the overall performance is bottlenecked by the speed at which the CPU can process its share of the data. During testing, this limits the benchmark performance of the entire test system and makes for unrepresentative results.

THE CPU BOTTLENECK

The first round of testing was performed with 3DMark05, which offers a picture of how the card will run under ideal conditions. Sure enough, a trend emerged: at 1,024 x 768, the 7800 GTX was nearly 30% faster than the 6800 Ultra, but at 1,920 x 1,200 the gap opened up and the 7800 GTX was more than 50% faster.

Similarly, the SLI setup showed a modest 15% boost in speed over a single 7800 GTX card at 1,024 x 768 and rose to nearly 50% faster at 1,920 x 1,200. Once 4x anti-aliasing and 6x anisotropic filtering were enabled at 1,920 x 1,200, the gap widened to over 60%.

This demonstrates the huge influence the CPU has on performance. As the resolution increased (and with it the number of pixels to process), a gap between the cards became evident as the 7800 GTX demonstrated its increased pixel processing power.

Things got even more interesting under Half-Life 2, where three separate demos were run, each designed to show off a different aspect of the game. The first test, which comes from an outdoor area of the game, showed the clenched hand of the CPU firmly under the performance throat. Not surprisingly, the GeForce 7800 GTX was 20% faster than the 6800 Ultra in this test. But the single 7800 GTX also outperformed the SLI setup by a teensy margin.

After retesting this, it was proved that the CPU was limiting performance, and the slight frame rate drop in SLI mode was indicative of the small performance overhead involved in using the two graphics cards. This also happened in the second Half-Life 2 test (the least strenuous test used), with the SLI setup lagging behind the single card.

It wasn't until the third test was fired up — one which featured a lot of detailed characters onscreen in a system-intensive part of the game — that the expected performance picture emerged. The single

7800 GTX was 70% faster than the GeForce 6800 Ultra, while SLI added a further 35% frame rate boost over the single card.

WHO SHOULD BUY ONE?

These results beg the question — is the GeForce 7800 GTX too powerful for its own good? LCD monitor owners with a maximum resolution of 1,280 x 1,024 will probably see only a small advantage over the previous generation product. But those with monitors capable of higher resolutions will definitely see improved performance and better image quality delivered by the 7800 GTX.

Running two of these cards in SLI mode is overkill for all but a very small percentage of the population. That said, the APC Labs team

had extensive debates over whose organs should be sold on the black market to fund an SLI 7800 GTX adventure.

After the GeForce 6800 and 6600 halted NVIDIA's slide into crappiness with the GeForce FX, it was make or break time for the company. In the GeForce 7800 GTX, NVIDIA has produced a card that is an improvement on the last generation in every way.

There can also be little doubt that ATI will release a product every bit as good as the 7800 GTX, but for now NVIDIA has taken the lead in the graphics war with a product that's difficult to fault. Even its obscene price is counterbalanced by obscene performance, a rare juxtaposition in the IT world. **BTB**

Anisowhat?

There are two main ways to increase the level of a game's visual detail. The first is to tweak the settings of the game itself, increasing texture quality, world detail and other such options made available in its video settings. Or you can tweak two main settings in your graphics drivers that improve image quality across all videogame titles. These settings are anti-aliasing and anisotropic filtering.

Anti-aliasing is used to smooth out the edges of characters, scenery and other objects in a game world. It's most effective with low-resolution imagery, as the jagged edges it fixes are less prominent in high resolution images.

Anisotropic filtering is employed to make the image look more detailed. When a textured surface is at an angle to the in-game viewpoint (such as the floor of

a corridor leading away from you), it blurs as you look into the distance.

To save on processing power, most games use a technique called mipmapping, which replaces distant textures with lower resolution versions. These mipmaps are then blended into each other using techniques called bilinear and trilinear filtering.

Unfortunately, these filtering methods don't take into account whether a surface is angled. This leads to crisp textures on surfaces that appear flat to the viewer, but cause a blurring and loss of detail when filtering occurs on angled surfaces.

Anisotropic filtering takes this effect into account, and while it can cause a performance hit, it also creates noticeably sharper images without the need for the game to support it.



The screenshot on the left was taken using only bilinear filtering, while the shot on the right was taken with 16x anisotropic filtering enabled.

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Dell 2405FPW

Dell's new 24in LCD monitor constructs a compelling argument for finally giving your ageing CRT the flick.



Say goodbye to space-eating CRT monitors and hello to a brilliant LCD screen at an amazing price.

The prices of LCD monitors are still crashing, and as they fall, the amount of display you get for your hard-earned dollars increases. This is putting large-screen TFT technology within reach of those with reasonable budgets for a monitor.

Rarely does a product make the APC Labs team sit bolt upright in awe of

a product's innovation, build quality or feature set, but Dell's 2405FPW wide-screen LCD made us snap so quickly on all three counts that the majority of us are wearing neck braces.

Impressive even on paper, the 24in, 16ms panel boasts 1,920 x 1,200 maximum resolution; 500cd/m² brightness; 1,000:1 contrast ratio; and AV inputs up the yin yang. It also has a side-mounted, multifunction memory

card reader, Picture in Picture (PIP) and Picture by Picture (PBP) support, and four USB ports — no more reaching behind your PC to connect devices.

PORT OF CALL

The AV inputs on this monitor put most modern televisions to shame with its S-Video, composite, DVI-D, D-sub and component RGB sockets. The 2405FPW easily accommodates a VCR, DVD player and game console, and displays output from a TV tuner card in your PC to provide analog or digital television at your desk.

PIP and PBP functions facilitate multitasking — a PIP window can be opened (in a choice of three sizes) in one of four positions around the corners of the screen. Alternatively, you can split the screen into two evenly-sized horizontal displays for side by side work. The downside of this method is that your desktop gets smaller (obviously), and it isn't ideal for reading.

However, PIP mode is a great way to play console games or watch a video from another source while an application you're working with performs a lengthy function. Best of all, since it comes from an external source, there's no additional load on your computer. There's even the option to switch between the boxed PIP and large desktop image, so you can watch a movie in full-screen while keeping an eye on the desktop progress

in the corner without needing to Alt+Tab or switch inputs.

BEST IN SHOW

The 2405FPW far exceeded all expectations — and indeed its own ticket price. Tests were performed using the *Aliens 3* and *We Were Soldiers* DVDs, some 1080i high-definition WMV9 video and the games *Splinter Cell: Chaos Theory*, *Half-Life 2* and *World of Warcraft*.

It performed superbly under each test, producing no noticeable tearing or motion blur, even while running fast-action video and first person shooters. This is due to its 16ms black to white (12ms grey to grey) pixel response panel. The LCD is top-notch, making it a fantastic wide-screen monitor for entertainment and gaming use. The brightness and vividness of colour really do need to be seen to be believed.

A screen like this demands nothing less than full 1,920 x 1,200 resolution, with all the detail settings on high. Granted, if you want to run this monitor in all its glory, you'll need a powerful graphics card to crank up the settings. The serious gamers and CAD users the panel is pitched at should already have the graphics base covered but, if you were so inclined, the large, wide display would make it easy to simultaneously view two Excel spreadsheets. Mind you, it would be a shame to waste the 2405FPW on bean counters.

The continuing increase in the popularity of native wide-screen support among videogame developers eliminates the requirement to find workarounds such as dimension-altering software, or running games in ugly, stretched 4:3 modes. Wide-screen is undoubtedly the aspect ratio of the future and, providing you can afford it, this monitor is a great way to test the water.

Its weighty metal base helps make pivoting this behemoth a one-handed affair, while adjusting and swivelling it into portrait mode for easy Web browsing simply means extending the height of the unit to give it room to rotate. This is achieved with help from a button on the rear of the stand.

The only substantial gripe with the 2405FPW concerns its AV input performance — when the monitor was hooked up to the test DVD player, the composite display looked like poor TV reception. Switching to component fixed the issue, but it means you'll need a device with component out to get the most from the screen.

With a comprehensive list of features, fantastic performance, and a price tag that looks like a typo, the 2405FPW is one monitor which APC Labs doesn't want to give back any time soon.

Dan Chiappini

Details

Contact	Dell
Phone	1300 303 107
Online	www.dell.com.au
Price	\$1,789.50
Intended market	Everyone



Bright and vivid display; fast response; great price.



Clumsy OSD controls.

Verdict



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Compro VideoMate DVB-T300

Highly
Recommended
September
2005
apc



You can get analog now and HDTV digital later — all with the one card.

A number of dual analog and dual digital TV tuners have been released over the past six months, but the Compro DVB-T300 is the first APC has examined with both an analog and digital (DVB-T) tuner (it also receives FM radio). This means it's perfectly useful now, even if you don't have digital reception, while switching to digital won't involve an upgrade. The analog tuner ensures that video input sources such as a VCR, older camcorder or cable television connection aren't made redundant.

The DVB-T300 supports inputs from an aerial connection, shared by both the analog and digital tuners, composite video and S-Video. A stereo audio input pairs with the composite and S-Video ports. The card ships with an IR remote control and a 2 x 2cm cabled receiver. The receiver connects to the rear of the card, but has a 1m extension cable to bring it to the front of the PC.

It's possible to connect the card in line with the PC chassis ATX power button, enabling it to turn the PC on and off for scheduled recording. The bundled software CD includes ComproDTV for viewing live broadcasts, recording and time shifting shows. Also included is ComproDVD2, a DVD playback

application that also supports MPEG-1, 2 and 4, as well as shows recorded earlier. ComproDTV scans for all available channels and adds them sequentially, so no more clicking through channels of white noise.

Both software packages are easy to manipulate with the included remote. While PVR fans may find ComproDTV limited, the DVB-T300 is fully supported by Showshifter and Windows XP Media Center Edition 2005, with BDM drivers included on disc. Ulead's PhotoExplorer is also included as an extra.

The DVB-T300's remote is user-friendly, solidly built and can be used to control all aspects of TV functionality, though the receiver was only able to accept commands when the remote was in a roughly 35 to 40° arc in front. The power passthrough also enables you to turn the PC on and off with it.

In testing, all local channels were scanned and identified within two minutes and picture quality was clear and crisp. There was a small yet noticeable delay in switching between channels and HDTV stuttered slightly when the PC was under load, despite no decoding or transcoding taking place.

The DVB-T300's analog performance was also good, though volume had to be regulated when switching between analog and digital as the digital reception was much louder. FM radio reception was on par with a standalone device.

Nick Race

Details

Contact Rectron

Phone (03) 9561 6166

Online www.rectron.com.au

Price \$148

Intended market Performance enthusiasts/gamer



Clear image; good remote;
MCE 2005 support.



Digital stutters slightly
when PC under heavy load.

Verdict



They look a million dollars but they cost under a hundred

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Acer Ferrari 4005WLMi

As befits its name, this stylish thoroughbred is a real speed demon.

Certainly one of the most striking notebooks APC Labs has ever seen, the Acer Ferrari 4005WLMi's carbon fibre and glossy red plastic chassis really stands out. But unlike the rather ordinary specs of its predecessor, this one's packed with exciting new technology, from AMD's mobile Turion 64 ML-37 processor to ATI's Mobility X700 graphics chip.

Based around a 15.4in wide-screen LCD with a native resolution of 1,680 x 1,050, the Ferrari 4005WLMi is by no means thin and light. Its focus is on grunt, but Acer has managed to balance this with a strong feature set and clever design.

On the front of the notebook sits a card reader (capable of taking SD, MMC, xD and Memory Stick media), headphone and microphone jacks, and two illuminated buttons used to toggle Bluetooth and Wi-Fi on and off. On the right-hand side are three USB ports spaced far enough apart to accommodate USB memory keys, and a slot-loading Double Layer DVD burner. Ports on the left include another USB, VGA out, modem, Ethernet, FireWire and a PCMCIA slot.

Considering its powerful components, APC Labs had high hopes for the performance of the Ferrari 4005WLMi. AMD's Turion 64 ML-37 is a 35W, 2GHz CPU with 1MB cache, and it's connected to an ATI

Express 200P-based motherboard alongside its new mobile graphics chip, the 128MB Mobility X700. The tested system had 1GB of DDR400 memory.

Thankfully, the machine lived up to expectations. In 3DMark05 the Ferrari 4005WLMi managed 2,359 — poor by modern desktop standards, but good for a notebook. In Half-Life 2 it averaged 47.77fps at the native 1,680 x 1,050 resolution. However, framerates spiked to unplayable levels at some points so in reality, running games at this resolution will be rare. In PCMark04 it scored 3,789, showing the Turion 64 as a very capable processor.

However, even with the Turion scaling back from a clock speed of 2GHz to 800MHz on battery power, the Ferrari 4005WLMi only ran for two hours and 42 minutes in the BatteryMark test. This reinforced the fact that this system is at its peak when tethered to a power socket, something belied by its 2.86kg weight but reinforced by its general size and appearance.

Overall, Acer has delivered a decent desktop replacement in the Ferrari 4005WLMi. While the aesthetics will only appeal to some, beneath that striking exterior lie robust, high-performance components that certainly do more justice to the illustrious Ferrari name than the previous models in this range from Acer.

John Gillooly



Details

Contact	Acer
Phone	1300 366 567
Online	www.acer.com.au
Price	\$3,999
Intended market	Everyone
✓	Decent performer packed with the latest mobile tech.
✗	Short battery life; high price tag.
Verdict	★★★★☆



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Philips 200W6 20.1in wide-screen LCD



Details

Contact	Philips
Phone	1300 651 993
Online	www.philips.com.au
Price	\$1,299
Intended market	Business

✓ Outstanding image quality and clarity.

✗ Mediocre built-in speakers; one USB port; light on for extra features.

Verdict ★★★★★

Big, clear and bright, Philips' wide-screen LCD has the right blend of performance and price.

With prices hovering between \$1,500 and \$2,000, 20in or 21in LCDs haven't represented great value for money — especially since 19in models can be had for around \$500 to \$800. But at \$1,299, this stunning 20.1in (51cm) wide-screen display from Philips equals great bang for your buck.

Aimed at the productivity market, the 200W6 has a modest 16ms refresh rate. It's not going to make any gamer's wish list, but frankly they'd be remiss to discount it for that reason. The screen is rated at 300 nits brightness with 600:1 contrast, and while many monitors look better on paper, few live up to the claims made by manufacturers. However, the 200W6 had APC Labs staff marvelling at its brightness and clarity under testing, and that's what sets it apart.

In a business context, the Philips truly shines. The screen's intensity and good contrast make it suitable for extended periods of use, while the high resolution wide-screen enables side by side viewing of documents and spreadsheets. An effective viewing angle of 176° enhances collaboration and makes it appropriate for use as a display monitor for presentations or permanent installation.

Testing was done with HD WMV film trailers and the game Pariah, a first person shooter running at

the screen's native resolution of 1,680 x 1,050. The game looked amazing, with no visible blurring due to the slower refresh, and a clear and vibrant image. Testing with DVD video during fast action scenes also showed no noticeable blurring.

Belying its business target market, the 200W6 is light on connection offerings, only supporting DVI and D-sub (VGA). A single audio input is available for driving the screen's built-in speakers, which are mediocre. Located in the side of the screen is a USB 2.0 hub, albeit with a single output. A headphone port is situated at a difficult position at the back of the monitor. There's an internal power supply, yet the monitor maintains a depth of 16cm.

A relatively simple affair, the 200W6's onscreen display includes options for colour presets at 6,500K, 9,300K, user-defined profile and system-set RGB. Display size, brightness and contrast can be adjusted, and the screen's input can be set manually. There are no options for Picture in Picture or other advanced image features. Sitting on a swivel base capable of around 250° of movement, the 200W6 can be adjusted vertically and on an angle.

The cost of larger LCD panels has long been prohibitive. Thanks to the Philips 200W6, more people can have access to a high-quality screen that's easy on the eyes and lighter on the wallet.

Nick Race

Sapphire Hybrid X800 XL 512MB



Is doubling onboard video RAM a quick performance boost or the next natural step for graphics cards?

For serious gamers and performance junkies, there are few upgrade paths more beneficial than more RAM or an updated graphics card. Sapphire has come to the party with a bit of both, offering its first 512MB product.

This card takes ATI's current generation X800 architecture and adds 256MB of video memory, allowing for greater storage of textures on the card. Memory-intensive tasks such as calculating shadows, geometry, normal mapping compression and high dynamic range lighting will all benefit from a larger memory footprint.

The X800 XL was strapped to a testbed consisting of a Pentium 4 3.4GHz Extreme Edition and 1GB of DDR2 memory. The card churned out an impressive 5,059 under 3DMark05 in the default 1,024 x 768 resolution tests, only 600 points shy of the more expensive Nvidia GeForce 6800 Ultra card used for comparison.

The gap narrowed further during 1,600 x 1,200 tests with four samples of anti-aliasing enabled, showing the X800's prowess in memory-intensive apps. The card's lowest average frame rate was 86.02 in the 1,600 x 1,200 4x anti-aliasing Half-Life 2 tests,

and 56.7fps in Splinter Cell with default 1,024 resolution and 4x anti-aliasing. Frametimes like this provide more than enough oomph to enjoy the latest games, even with all the eye candy enabled.

Sapphire has included a swag of cables, overclocking software, and CyberLink's Power2Go 5 and PowerDirector 3DE. The review unit also came with Splinter Cell: Pandora Tomorrow and Prince of Persia: The Sands of Time, but by the time you read this, Sapphire cards should be bundled with a disc containing several different games. Buying the card lets you play each of the games for an hour before using the supplied activation code to choose the game you want and register the full version.

While the card features two DVI ports for monitor connection, it only has one DVI to D-sub adaptor, meaning users with two CRTs will need to find a second one for dual-screen setups.

Sapphire has also thrown away the ATI reference cooler design in favour of an almost silent Zalman fan. The fan's size means it's a two-slot card, eating an extra one of your backplane ports and possibly covering a PCI Express 1x or PCI slot in the process.

The X800 has the performance to make it an impressive upgrade for many gamers, but the high pricetag may be enough for you to consider buying top-of-the-range at a slightly higher cost.

Dan Chiappini

Details

Contact	Achieva
Phone	(02) 9742 3288
Online	www.achieve.com.au
Price	\$899

Intended market Performance enthusiasts/gamer

✓ Great bundle: high performance card.

✗ Single plug adaptor; high price.

Verdict ★★★★★

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Shuttle XPC ST20G5



Slender and shiny, the Shuttle XPC ST20G5 demonstrates mainstream appeal.

Shuttle's small form factor barebones case and motherboard kits have given the company a deserved reputation for creating quiet, high-performance powerhouses. Now the introduction of a mainstream chipset in the XPC ST20G5 suggests a change of direction.

The system is based on ATI's Radeon Xpress 200P chipset with integrated graphics, used mainly in notebooks (such as Acer's Ferrari F4005WLMi, see page 47), desktops, and occasionally in HP media centre PCs. The 200P's DirectX 9-compatible graphics adaptor is roughly equivalent to the performance of a Radeon X300-based card.

The Shuttle XPC ST20G5 has a Socket 939 for use with AMD Athlon 64 and X2 processors. Also included is a single 16x PCI Express slot for discrete graphics (though physically larger or double-width cards wouldn't fit into the cramped interior) and a PCI slot for expansion. Space for one SATA hard disk drive, optical drive and floppy is available, but that's all.

While the 240W power supply is ample for the integrated components, high-end video cards may suffer due to the low power available. VGA and DVI connectors output from the integrated graphics, so both traditional CRT and modern LCD monitors are

directly supported. A Realtek ALC880-driven, 7.1-channel audio output is on the rear panel, along with optical S/PDIF input and output connectors.

APC Labs built the XPC ST20G5 up with an Athlon X2 4800+, 512MB of DDR and a Seagate SATA hard disk drive. After some initial difficulties installing an updated BIOS for the X2 support, the system was fast and responsive under 2D tasks. Attempts at benchmarking it with the X2 were hindered, however, with both PCMark04 and PCMark05 reporting wildly inaccurate scores. Swapping the CPU to an Athlon FX-55 (single core) processor brought the benchmarks into line, and the system subsequently scored 4,688 in PCMark04. The total score was let down by the internal graphics; though powerful compared with older onboard graphics solutions, this iteration still dramatically lags behind standalone cards.

The Radeon Xpress 200 chipset is reasonable and performance with a video card installed was good. However, the single PCI slot reduces its usefulness as a media centre and limited power narrows the options for installing performance video cards.

Shuttle's design for the XPC ST20G5 is thoughtful, its internal components are easy to access and install, and the finished system stays cool and quiet. But while it's a competent system, it's difficult to get excited about either the features or performance.

Nick Race

Details

Contact	Altech Computers
Phone	(02) 9735 5655
Online	www.altech.com.au
Price	\$615
Intended market	Everyone



Stylish; very quiet.



Limited upgrade options: integrated graphics performance.

Verdict



Panasonic Lumix DMC-FZ5

Are five megapixels a technological step backwards or an exercise in affordable photography?



As the digital camera market turns its focus to models with at least 8 megapixels, it's interesting that Panasonic has released a new 5 megapixel unit.

An update to the DMC-FZ3, the DMC-FZ5 packs an extra 2 million pixels, a larger 1.8in LCD and a 36-432mm (35mm equivalent) 12x optical zoom. As with the FZ3, the new model also includes the Venus Engine II and sports Panasonic's Optical Image Stabilisation (OIS) technology to help reduce camera shake.

Designed to be user-friendly as possible, the DMC-FZ5 has a "simple" mode with larger menu graphics and less tweakable options for inexperienced users and kids. It's also chock-full of features for those after more control, including a range of semi-manual modes, though photography buffs wanting a fully manual camera should look elsewhere as there's no manual focus ring.

Regardless of the mode you choose, the DMC-FZ5's Venus Engine II helps to correct colour aberrations (coloured fringing) and vignetting (darkened corners of images), although it wasn't totally successful during testing.

The body is made from plastic and at 290g, is a pleasure to carry around all day. However, you get

the distinct impression it wouldn't take too kindly to rough handling.

Under testing, the DMC-FZ5, which comes with a high-quality Leica lens, was used to shoot images in both natural light and using the artificial lighting compensation mode. Image quality was good, and the 12x optical zoom lets you get nice and close to the action. Colour reproduction was accurate, and an acceptable amount of digital noise was present when shooting in low-light conditions.

The DMC-FZ5 features nine preset scene modes (portrait, night portrait, scenery, night scenery, sport, panning, fireworks, party and snow) to help you take the best photos regardless of the situation. What's more, the camera's three second start-up time will do its best to make sure you don't miss that once in a lifetime moment.

Panasonic's software bundle includes Arcsoft Photobase, Panorama Maker 3 and Photoimpression 5. The software is incredibly easy to get the hang of and you'll quickly be creating albums, slideshows, calendars and panoramic images.

While the DMC-FZ5 is a well-built camera with lots of useful features, and you get quite a bit of kit, its price puts it close to its 8 megapixel competitors. At the same time, travellers and outdoor enthusiasts might want something slightly more robust.

Dan Chiappini

Details

Contact	Panasonic
Phone	(02) 9986 7400
Online	www.panasonic.com.au
Price	\$879
Intended market	Everyone



Light; good quality images; reasonably priced.



Easily damaged; no manual focus.

Verdict



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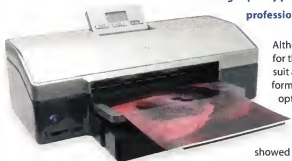
<http://www.zcom.co.nz>

Auckland 64-9-5860222



HP Photosmart 8750

High-quality photo printing for home users and professionals at less than \$1,000.



Although it was designed as a printer for the pros, the Photosmart 8750 would suit any home user wanting large format photos up to 4,800 x 1,200 optimised dots per inch.

Its biggest drawback is its nine-ink system, broken down into three cartridges. Test prints all showed incredibly good shadowing and depth, thanks largely to the wide tonal range and gradients of colours, particularly blues and greys. This was especially evident in test photos, taken at a beach, where the water met the sky.

A range of test images was printed on A4 and A3 high gloss photo paper, including scenic, beach, portrait and macro shots. The results were amazing, particularly with the standard APC Labs high-res test image, where the 8750 turned out the best print seen in the Labs so far. There was no evidence of banding, dullness or misregistration, colours appeared vibrant and true, detail was impeccably sharp and the sample even exposed portions of the photo not previously seen off-screen. The portrait test image showed true to life skin tones, producing prints you'd gladly frame for display.

Details	
Contact	HP
Phone	13 13 47
Online	www.hp.com.au
Price	\$899
Intended market	Prosumer

✓ Fantastic quality photo prints; well priced.

✗ Uses large amounts of ink; need to frequently change cartridges.

Verdict ★★★★★

On the downside, the Photosmart 8750 measures 64cm x 43cm at its widest points without extending the paper trays, so it does require the sacrifice of a substantial amount of desk space. However, there's room to store a spare cartridge internally.

PictBridge support and a front-mounted, multifunction memory card reader are featured, allowing you to print directly from a digital camera and transfer files to your PC. The LCD on the top of the unit doesn't display images, but can be used to print a photo index sheet from the memory card.

The Photosmart 8750 also has integrated 10/100 Ethernet (allowing you to use the printer as a shared device across multiple machines), and an optional Bluetooth wireless adaptor (\$100).

It comes with 64MB of memory, but best quality resolution printing requires 128MB and additional hard disk space to perform. The other head scratcher was the inclusion of tiny, 14ml ink tanks, so heavy users will need to replace the cartridges often. The replacement cost of cartridges is high, ranging from \$39.95 to \$46.95 each.

Capable of stunning photo prints at everything up to borderless A3 size, picture quality certainly won't disappoint. However, the Photosmart 8750's long-term running costs for frequent use in its intended prosumer market will be a concern to many prospective buyers.

Dan Chiappini

Toshiba Portégé R200

It's thin, affordable, has a comprehensive warranty and an absolute stunner. We'll take one.

As notebook design goes, it doesn't get much better looking than Toshiba's R200. It's a 1cm-at-the-front, 2cm-at-the-back, 1.15kg, magnesium-chassis beauty that makes Apple's PowerBook look dated.

With its 12.1in screen, Pentium M 1.2GHz ultra-low-voltage processor, 512MB DDR2 RAM and 1.8in iPod-style 60GB hard drive, the R200 achieved a good battery life result of three hours and 43 minutes with all power-saving features disabled and the screen on full brightness.

Real-life usage with Toshiba's battery saver configuration will provide better results. The company also offers an optional high-capacity battery with a claimed 10-hour life for \$182, though it wasn't supplied for testing.

While not exactly a fast machine — it achieved a PCMark04 score of 2,180 compared to the 3,789 accomplished by the speed-focused Acer Ferrari (see page 47) — it's snappy enough for office and Web work. It's clearly a machine focused on battery life and portability.

The built-in 802.11g wireless networking has incredible reception sensitivity. In places where only one or two wireless networks could be detected with other equipment, the R200 routinely picked up

eight or nine. This is useful in airport gate lounges with weak Wi-Fi reception, or hotels which may be within range of free cafe hotspots, allowing you to avoid expensive in-room Internet charges.

At \$3,520, it's a lot more affordable than its predecessor, the R100, which debuted at \$4,400 (at the time of writing, the R200 was selling for \$3,235 at www.hboutlet.com.au). However, you'll need to cough up a staggering \$520 for the external DVD-ROM/CD-RW combo optical drive. You could use a third-party external optical drive but, according to Toshiba, you won't be able to boot from it.

Other upsides include built-in SD card and fingerprint readers (with software for linking your fingerprint to your Windows login and Internet Explorer passwords reader); a dedicated key for switching video output; Norton AntiVirus; and Toshiba's fantastic ConfigFree software utility for guided visual configuration of networking.

Minor gripes include the physical volume dial, which is outdated compared to keyboard-controlled volume; and the ultra-shiny trackpad, which gets covered in fingerprints the moment you use it.

Finally, Toshiba's warranty is an outstanding three years with free courier pick up and return. Plus, the upgrade to next business day onsite service only costs \$274, or \$349 for regional coverage.

Dan Warne



Details	
Contact	Toshiba
Phone	13 30 70
Online	www.isd.toshiba.com.au
Price	\$3,520
Intended market	Business

✓ Extremely light; thin; good battery life.

✗ \$520 extra for the external optical drive.

Verdict ★★★★★

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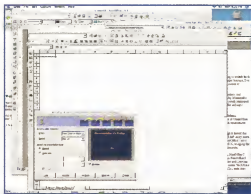


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NeoOffice/J 1.1



Office suites for Mac have been limited, but there's a new player on the field.

Apple's recent release of the iWork productivity suite (see *APC* July, page 38), consisting of the Pages word processor and Keynote presentation software, upped the ante in a market dominated by Microsoft's Office: Mac suite. Though iWork shows promise, Apple still needs to improve the software before it becomes a serious productivity application.

In a market dominated by Microsoft Office, OpenOffice.org has been a surprising success. Mac OS had its own port of OpenOffice based on the Unix port, though it forced the user to run the suite under X11 (or XDarwin). Now there's a second alternative in the shape of NeoOffice/J (NOJ). It uses a Java interface to take care of installation and OS integration in Mac OS X, bringing the suite in line with the Aqua interface and use of system fonts and resources.

Boasting a range of apps for a total productivity solution, NOJ includes a word processor, spreadsheet application, presentation creator and drawing functionality. If you're familiar with OpenOffice you'll feel at home with NOJ due to their common roots, but newcomers face a bit of a learning curve.

NeoOffice/J was written to include support for Microsoft Office file formats, including Word documents, Excel spreadsheets and PowerPoint presentations. APC Labs tests showed that NOJ was capable of opening, editing and saving in those formats, though some more complex Word documents showed visual changes for the worse when imported into NeoOffice/J.

Spreadsheet functionality is basic in comparison with Excel, and a number of Excel macro-driven spreadsheets broke completely once imported. The presentation component is a step up from iWork's Keynote in terms of functionality, however, it suffered in the usability stakes and ran surprisingly slowly on the dual 800MHz G4 test system.

The drawing component of NOJ offers little beyond the freeware applications available for all desktop operating systems and features some idiosyncratic design choices, such as 3D toolbars minimising to the Dock as a separate application. As a basic drawing tool it's quite clunky and users are better off downloading other free alternatives.

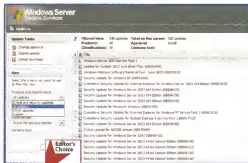
As a total experience NeoOffice/J is encouraging, but the suite feels somewhat unfinished. As it's free, there should be no complaints, but anyone wishing to convert a workforce to this suite should think long and hard before making the change.

Nick Race

Details

Contact	NeoOffice/J
Online	www.planamesa.com/neojava
Price	Free
Intended market	Everyone
✓	Full featured productivity suite; Microsoft Office file support.
✗	Areas need improvement; slow.
Verdict	★★★★☆

Microsoft Windows Server Update Service



Here's a powerful manager that makes downloading all those patches easy.

With the release of Windows Server Update Services (WSUS), Microsoft officially ended its support for Software Update Services 1.0 (SUS). From 6 June 2005, no updates will be distributed to SUS 1.0 servers, although connected clients will still be able to download patches.

WSUS contains comprehensive changes which will have desktop administrators very excited. The limitation of SUS to deploy only security updates and critical patches for Windows 2000 and XP has been completely revamped. WSUS not only supports Windows 2000, XP, XP 64-bit, 2003 and 2003 Datacenter, it also provides updates for Exchange 2000/2003 Server, SQL Server and Office 2002/2003. Additionally, it makes development, service and rollout packs available, along with some hardware drivers and connectivity tools.

Functionality has also been greatly enhanced. When the server synchronises with an update server (either the main Microsoft servers or another WSUS server), only the list of available updates is added, based on the local server's synchronisation options. Unlike SUS, which downloaded all available

packages before they had been approved, WSUS waits for each package to be approved before downloading, which is a great time and bandwidth-saving feature. What's more, language exclusions have finally been enforced, so if you only want English updates, that's all you'll get.

A fantastic new feature is client targeting. The WSUS server gathers basic information about each client connecting to it — computer name, MAC address, operating system version and so on. It then keeps track of the updates it has distributed, and which ones are outstanding.

WSUS also displays alerts when a known client hasn't connected for a specified period of time, and that client can have updates forcibly pushed to it. All clients can be organised into user-specified groups, giving administrators a great tool for keeping track of updates across the network.

All this extra information requires a robust back end, and WSUS is a database-driven application. It runs off either an existing WMSDE or SQL 2000 SP3 database server or MSDE2000a, which ships bundled with the install for Windows 2003 and is available as a separate download for Windows 2000 Server. BITS 2.0 (Background Intelligent Transfer Service) on both platforms is a prerequisite. WSUS does not install on any other operating system.

James Bannan

Details

Contact	Microsoft
Phone	13 20 58
Online	www.microsoft.com/windows/serversystem/updateservices
Price	Free
Intended market	Enterprise/business
✓	Powerful and comprehensive administration features.
✗	Greatly increased back-end requirements.
Verdict	★★★★☆

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Ulead VideoStudio 9



Workflow is timed like a film strip for ease of use.

APC puts the latest version of Ulead's consumer-friendly yet comprehensive video editing suite to the test.

Ulead VideoStudio has had several revisions over the last few years, and version 9 is packed with features that will even have novice digital video hobbyists churning out DVDs with plenty of flair.

The suite is broken into three main functionality sections. On loading, a screen offers a wizard for burning

a DVD direct from a digital video (DV) camera — great if you want to archive footage straight from your camcorder or working off optical media if hard disk space is limited. The process is largely

automated, with the software identifying scenes from the DV footage, then adding each clip to the DVD as a separate scene. This wizard is helpful when adding titles, transitions, a menu and music based on a theme. DVDs can then be burned directly from the application.

A second wizard leads you through the movie-making process. Though APC Labs have never been fond of "cut and paste" home DVDs based on cheesy or inappropriate themes, there's a great deal of flexibility throughout the prompted build process.

The Movie Wizard allows capture from any video input device attached to the PC, including video-in on graphics adaptors, digital camcorders and TV tuner cards, with channel selection built in. Stills and other footage can be captured with one click into a variety of formats, including AVI, MPEG and DV, in a number of preset resolutions matching DVD, VCD, SVCD in PAL or NTSC. Resolution, framerates and quality levels are also adjustable. Video for the Movie Wizard can be imported from pre-existing files in range of formats including HDWMV, MPEG-4, QuickTime and raw DV.

CHOOSE YOUR TEMPLATE

Once files are imported, they can be dragged along the film strip-style interface on the bottom of the screen for correct ordering before you add the style. Twelve templates ranging from MTV to Drive-In Movie are included, as well as a blank template for user customisation. The templates add video effects, a soundtrack (which can be easily changed), and an introduction and ending with optional previews. When you're finished, you can save the video file, burn to disc or import into the main program.

The wizard experience is straightforward and fast but the templates lack imagination. Exporting to MPEG-4 requires an additional plug-in, though an

enterprising user could encode their files with a separate application.

The main part of the suite, the actual VideoStudio 9 app, has a new interface which, while handy when dealing with specific video elements (a toolbar tab appears for changing video effects when added to a clip, for instance), is a step backward as far as usability is concerned. For instance, the minimise button has been replaced with a help icon, which means a quick application change or moving to a Windows directory for video clips requires more thought and false starts than it should.

Workflow is timed, with a series of tabs delineating the standard steps in piecing a project together. A capture tab presents tools for capturing clips into the media library, while pre-existing files can be added to the library at any time. Editing, effects, overlays, titles, audio and outputting (Share) are also represented as distinct steps.

"I'M READY FOR MY CLOSE-UP"

Putting together a movie can be simple at first, advancing to a more complex interface for users comfortable with video editing.

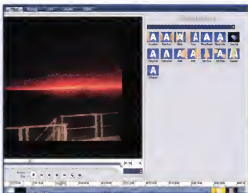
A film strip timeline is the default design layout, and the main window is refreshingly uncluttered. The main playback window automatically switches between the applicable clip and the project as a whole, and the film strip can be switched to a timeline and back at will.

The application also features "ripple editing". When footage is inserted or removed from the timeline, the other clips, audio, effects, transitions and overlays automatically jostle into new, logically applied positions on the timeline. This feature can be toggled off at the timeline when it's not needed.

Also new is a chroma key function, which works well with plain backgrounds and isn't necessarily limited to the classic blue or green screens. Full 16:9 wide-screen support for both for video and DVD menus has been added, keeping your video in the correct ratio from beginning to end. Lastly, it has Macromedia Flash support — a feature which really sets this application apart from the competition. Files in SWF format can be added as part of the timeline and, most importantly, as an overlay.

The APC Labs team used VideoStudio 9 to put together some short movies and it didn't present any major challenges. However the test system, a Pentium 4 3.6GHz with 512MB of DDR1-533 RAM and Seagate SATA hard disk drive, suffered with even the slightest change, and live previewing of transitions brought it to its knees. The new functionality and look have added to the app's sluggishness, though this can be overcome with tailored hardware.

Nick Race



Ripple editing makes light work of inserting transitions and overlays.

Details

Contact Lako Pacific
Phone 1800 657 601
Online www.lakopacific.com

Price \$199

Intended market Prosumer

✓ Ripple editing: fully featured, automated DV to DVD; 16:9 support.

✗ Sluggish performance; non-standard interface.

Verdict ★★★★★

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Numbers are average, actual capacity depends on the user's actual stored files.

¹3.85GB is user accessible. ²Wireless email access within service coverage area only. Bluetooth functionality requires compatible Bluetooth GSM mobile phone, data services from a mobile service provider and an ISP sold separately. Some Wi-Fi hotspots require a fee for usage. Microsoft Exchange Server 2003 or VPN may be required.

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Hit the shops

Stay on top of product releases with APC's monthly run-down of the best of the best.

There has been an overwhelming wave of techno-lust directed at some of the products tested in the APC Labs this month. The new additions to Best Buys are jaw-droppingly great examples of each product class. NVIDIA has raised the 3D graphics bar again with its tweaked up GeForce 7800 GTX card, which delivers a level of performance that had the APC Labs staff shaking their disbelieving heads.

While Dell isn't the first company you think of when it comes to monitors, its 2405FPW is a gorgeous combination of form and function for an insanely reasonable price (and the perfect thing to pair with the 7800 GTX). For those who want mobile computing, Toshiba's Portégé R200 is an attractive, highly functional sliver of computing goodness in a very small package.

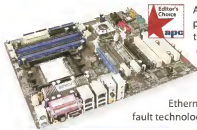
If you take your computing seriously, there are two new entries in the server space, the Plus Titan OP250 (winner of the Editor's Choice in this month's Labs Challenge, page 62) and the Maxtron C5PC-823SATA, which took out the Highly Recommended award.

Each state and territory has its own fair trading legislation designed to prevent consumers being mistreated by vendors or retailers, but the national Trade Practices Act 1974 provides protection across a range of areas. It provides guidelines for warranties, sets the standard for "merchantable" quality goods and offers protection against misleading conduct by retailers. The Federal Government's consumer portal can be found at www.consumersonline.gov.au.

The Australian Competition and Consumer Commission (ACCC) also offers protection. It can be reached at www.accc.gov.au.

Processor/motherboard

ASUS A8N-SLI Deluxe/ AMD Athlon FX-55



ASUS' A8N-SLI Deluxe offers great performance, SLI capabilities, three PCI slots and support for eight SATA II drives using onboard NVRAID. Audio includes onboard digital and optical S/PDIF outputs. The two Gigabit Ethernet ports have ASUS' AI NET 2 cable fault technology enabled.

The software package includes NVIDIA nTune and Firewall, ASUS PC-Probe and AI Booster, Norton Internet Security 2005, Winbond Voice Editor, and InterVideo WinDVD. Add AMD's Athlon FX-55 processor, and you've got a super-fast solution.

Details

Contact Achiva
Phone (02) 9742 3288
Online www.achiva.com.au
Price Motherboard, \$299;
processor, approx. \$1,400

ASUS A7N8X-E/AMD Sempron 2600+

AMD's entry-level Sempron processors offer a 333MHz FSB and 256KB of level 2 cache. Enhanced Virus Protection is built in and enabled by Windows XP. Combine the chip with an ASUS A7N8X-E Deluxe motherboard to get a powerful yet low-cost base platform.

Details

Contact Achiva
Phone (02) 9742 3288
Online www.achiva.com.au
Price Motherboard, \$200;
processor, \$130

Desktop systems

Dell Dimension XPS Gen 4



Based on the i925XE chipset, Dell's Dimension XPS gaming system offers full support for Pentium 4 Extreme Edition processors. The \$2,298 base model has a 3.4GHz Pentium 4 processor, 512MB of dual-channel 533MHz DDR2 SDRAM, 80GB SATA hard disk, 48x CD-RW/DVD combo drive, Sound Blaster Audigy 2 ZS, 128MB Radeon X300 video card and Windows XP Home (serious gamers should upgrade some components). A wireless keyboard and mouse are bundled, but no monitor.

The only let-down for gamers is the lack of SLI support and the one-year warranty, but it's still a quick and well-priced system.

Details

Contact Dell
Phone 1300 303 107
Online www.dell.com.au
Price \$2,298

Optima WorkPro D9S

The WorkPro D9S from Optima is an excellent performer, with an extensive software suite and a three-year warranty. It employs a 3.2GHz Pentium 4 processor, 120GB Seagate hard disk drive, 1GB of dual-channel DDR RAM, Double Layer DVD burner, 19in TFT display and a TPM chip for added security.

Details

Contact Optima
Phone (02) 9701 3777
Online www.optima.com.au
Price \$2,000

Notebooks

Toshiba Portégé R200



Weighing only 1.15kg, less than 2cm thick, and encased in magnesium alloy, Toshiba's Portégé R200 is both sexy and incredibly functional.

Designed for ultra-portability, it has a 1.6GHz Pentium M Ultra Low Voltage CPU, 512MB DDR2 memory, Wi-Fi and a 60GB hard drive. The only feature it lacks is an optical drive, left out because it would be physically impossible to squeeze one in.

It scored well in battery life tests while still delivering robust performance in everyday tasks. Considering its extreme portability, the lack of optical drive can easily be forgiven. All in all, a wonderful meeting of form and function.

Details

Contact Toshiba
Phone 13 30 70
Online www.jad.toshiba.com.au
Price \$3,520

Acer Aspire 1690

The Acer Aspire 1690 features a 1.6GHz Pentium M processor, a 15in wide-screen display running at 1,280 x 800 pixels, Double Layer DVD±RW drive and 60GB hard disk. The base RAM is meagre at 256MB, but you can always add more if you need it. At around 3kg, this machine doesn't feel like dead weight.

Details

Contact Acer
Phone 1300 366 567
Online www.acer.com.au
Price \$2,699

Digital cameras

Nikon D70



The Nikon D70 offers a 6.1 megapixel CCD and 0.13 second shutter response time. It features a Nikkor F mount which accepts a wide range of Nikon lenses, including regular G or D AF-type SLR lenses. The 18–70mm lens bundled with the camera offers aperture ranges from f/3.5 to f/4.5.

The camera resembles an SLR and offers the same range of settings. Users have a choice of fully automatic or a range of scene modes. Bracketing and a useful selection of shooting modes are also supported, including single frame, 3fps and a self-timer.

Details

Contact	Maxwell
Phone	(02) 8748 5200
Online	www.maxwell.com.au
Body	\$1,999;
D70/AF-S with 18–70mm	
DX lens	\$2,299

Olympus Camedia C-5060

At just \$1,099, Olympus' 5.1 megapixel Camedia C-5060 is hard to go past. The 27–110mm, 4x zoom lens offers a wide-angle and a super macro mode, and it's reasonably fast with an f/2.8 to f/4.8 aperture range. A variety of shot, meter, focus, white balance, exposure and image file modes are also available.

Details

Contact	Olympus
Phone	1300 659 678
Online	www.olympus.com.au
Price	\$1,099

ADSL modem/routers

Billion BIPAC 7402



One of the new breed of super-fast ADSL2/2+ modems, the Billion packs the right combination of features with quick download speeds. You get a four-port switch, Wi-Fi (802.11b),

firewall and VPN support. Importantly, there are enough customisation options to handle multiple PCs, software types and games.

Home business users will appreciate the built-in encryption engine. The BIPAC 7402 averaged an awesome

2,020KB/s in short-range testing (1km), downloading a 635MB file in five minutes.

Details

Contact	PC Range
Phone	(08) 8322 9544
Online	www.pcrange.com.au
Price	\$239

Belkin F5D7630au4A

The F5D7630au4A from Belkin is one of the best value all-in-one routers available today. Superb out-of-the-box functionality, SSID hiding, WPA-PSK and 128-bit WEP wireless security features are all offered. The one disappointment is that there's no print server capability or line filter in the retail box.

Details

Contact	Belkin
Phone	1800 666 040
Online	www.belkin.com/au
Price	\$300



TFT screens

Dell 2405FPW



Dell's 16ms, 24in wide-screen LCD monitor is a hot piece of technology. Its unobtrusive design lets the 1,920 x 1,200 resolution panel dominate your view, while its plethora of inputs, from DVI to component video, make sure it's ready to cope with most image output devices.

There's even a card reader and four-port USB hub built into the side of the screen.

Image quality is superb, with no ghosting evident in games or video. The support for HD video resolutions means this screen just gets more and more useful as HD-capable set-top boxes, game consoles and TV tuners hit the market.

Details

Contact	Dell
Phone	1300 303 107
Online	www.dell.com/au
Price	\$1,789

CMV CT-720D

The CT-720D from CMV is a stylish LCD monitor with above average image quality and a very bright screen, making it especially suitable for use in environments with lots of ambient light. Add the 8ms refresh rate and supplied 2.5W speakers and you have an excellent value package for gamers.

Details

Contact	Impact Systems
Phone	(02) 9621 2999
Online	www.impactsystems.com.au
Price	\$425

Handhelds

HP iPAQ hx2750



HP have released a bevy of new PDA products, and the pick of the bunch is the iPAQ hx2750 due to its outstanding array of features. Its small, gunmetal grey body measures 11.9 x 7.7 x 1.6cm (HWD), and weighs just under 165g.

This top dog in the world of handhelds sports an Intel PXA270 processor clocked at 624MHz, with 128MB of RAM and 128MB of ROM. It also has built-in Bluetooth and Wi-Fi for connectivity on the go.

The 240 x 320 pixel display is clear and bright, although it's also a potential point of complaint in the future. VGA resolutions are beginning to appear on handhelds, though there are few apps capable of taking full advantage of it yet.

Details

Contact	Hewlett-Packard
Phone	13 23 47
Online	www.hp.com/au
Price	\$899

palmOne LifeDrive

PalmOne's "Mobile Manager" product takes the tried and true PDA design and marries it to a 4GB hard drive. With a 320 x 480 pixel display, Wi-Fi, Bluetooth and 64MB of RAM, the LifeDrive provides storage capacity galore, plenty of features, and palmOne power in one small package.

Details

Contact	palmOne
Phone	(02) 9844 5420
Online	www.palmone.com/au
Price	\$899

External hard disks

Maxtor Shared Storage Drive



Editor's Choice
Designed to provide a central storage repository for a home network or small business, the Maxtor Shared Storage Drive is a comprehensive yet compact package. It's also exceptionally easy to install, with setup handled through a straightforward Web interface. It attaches to the network via Ethernet and even has a couple of USB 2.0 ports at the back for additional storage devices or USB printers.

There are two ample size alternatives — a 200GB drive with an 8MB cache, or 300GB with 16MB cache. The drive runs a proprietary stripped-down Linux operating system, developed by Maxtor and based on the 2.4 kernel.

Details

Contact	Maxtor
Phone	(02) 9369 3662
Online	www.maxtor.com
Price	200GB, \$449; 300GB, \$549

Seagate 5GB Pocket Drive

E Sometimes portability outweighs the convenience of having hundreds of gigabytes of storage space in an external drive. Advances in miniature hard disks have led to Seagate's impressive 5GB Pocket Drive. The entire USB 2.0 unit measures 7cm in diameter so you can take it almost anywhere.

Details

Contact	Ingram Micro
Phone	(02) 9701 4500
Online	www.seagate-asia.com
Price	\$349

Small business servers

NEW
category

Plus Titan OP250



Editor's Choice
Designed for a multitude of small business needs, the Titan OP250 from Plus is built around dual Opteron 250 CPUs and AMD's 8311/8111 server chipset. It has a generous 2GB of RAM and 223GB of storage thanks to a RAID 0+1 array. All this technology is packed into a mini-tower case which is easy to work in if needed. It delivered some truly outstanding performance in APC Labs' server benchmarks, and has a well-rounded hardware specification that's perfect for the

general purpose nature of small business serving.

The three-year onsite warranty should give peace of mind to companies lacking a full-time technician to maintain the server.

Details

Contact	Plus Corp
Phone	1800 007 587
Online	www.pluscorp.biz
Price	\$4,695 (without OS)

Maxtron CSPC-823SATA

E This dual Xeon 2.8GHz server comes in a 2U rack-mount enclosure. It features 1GB of RAM and 198GB of disk space in a RAID 5 array, and even includes dual hot-swappable 600W PSUs. It's highly flexible and is a great all-round performer — perfect for small businesses with an eye on the future.

Details

Contact	Digicor
Phone	(03) 9560 7222
Online	www.digicor.com.au
Price	\$4,999.50 (without OS)

Optical drives

ASUS DRW-1608P



Editor's Choice
Fast and packed with features is the best description for ASUS' DRW-1608P drive. Capable of 6x burning Double Layer discs, this

drive wrote 8.5GB of data to a single layer disc in a shade under 19 minutes, at an average speed of 5.84x. It can also burn $\pm R$ discs at 16x. It's also worth noting that this speed was achieved with the standard 2.4x Double Layer media rather than any specialised 6x discs.

Details

Contact	ASUS
Phone	1300 278 788
Online	www.asus.com.au
Price	\$129

The drive ships with Nero 6 OEM Suite 3 and Ulead DVD Movie Factory 3 SE for basic authoring of DVD-Video. A very well-rounded offering and currently the fastest option for those focusing on Double Layer burning.

Gigabyte GO-W1616A

E The GO-W1616A drive from Gigabyte is capable of both 16x $\pm R$ and 4x Double Layer +R burning at a price that makes DVD burning a reality for the masses. Despite the bargain price, it doesn't skimp on the bundle — Nero 6 OEM Suite 3 and a black face-plate are excellent value accompaniments.

Details

Contact	Rectron
Phone	(03) 9561 6166
Online	www.rectron.com.au
Price	\$93.95

Printers

Fuji Xerox DocuPrint C525A



Editor's Choice
Super fast mono printing and brilliant colour make the C525A hard to beat as a replacement for an old mono unit. You get 64MB of memory and a 9,600 x 600 interpolated print resolution — some competitors can only claim 2,400 x 600.

The standard tray can handle 200 sheets, and you have the option to purchase 250- or 500-sheet trays if required. The two-line LCD means settings can be adjusted directly at the printer, and the directional controls are easy to use. It's a little noisy, but the levels are acceptable for most environments.

Details

Contact	Fuji Xerox
Phone	13 14 12
Online	www.fujixerox.com.au
Price	\$799

Canon LASER SHOT LBP-2410

E A desktop colour laser at a price unheard of just two years ago. Rated at 16ppm mono and 4ppm colour, it's perfect for the home or small office. Hi-SCO (Hi-Smart Compression Architecture) means it only needs 8MB of memory to store pages. Not the fastest, nor the best quality, but for the price it's a winner.

Details

Contact	Canon
Phone	1800 021 167
Online	www.canon.com.au
Price	\$699

Video cards



NVIDIA GeForce 7800 GTX



NVIDIA has taken the incredibly successful GeForce 6800 architecture and overhauled it to deliver the fastest gaming card to ever enter the APC Labs.

The GeForce 7800 GTX is capable of making even the most system-intensive game run smoothly at high resolutions, thanks to 24 highly-tweaked pixel shading pipelines. This PCI Express-only card supports hardware decoding of WMV9 high definition video, and H.264 decoding is just around the corner.



Available from a variety of manufacturers, the 7800 GTX features 256MB of GDDR3 memory, dual DVI output and TV-out. For a truly decadent gaming experience, you can run two cards in SLI mode.

Details

Contact NVIDIA
Online www.nvidia.com
Price US\$599

Leadtek Winfast PX6600 GT THD 128MB

Fancy a card that offers good gaming performance and value? Leadtek's new Winfast card runs quietly and ships with a solid software package.

The PX6600 GT includes 128MB of GDDR3 RAM, 128-bit memory bus, eight pixel pipelines and support for DirectX 9's Shader Model 3.

Details

Contact Reclon
Phone (03) 9561 6166
Online www.reclon.com.au
Price \$299

Online photo album creators



JAlbum



If you're looking for flexibility, JAlbum is simply the best program to create photo albums online. There are many different visual themes available. Take a look at



the JAlbum skin repository (<http://jrepository.engblom.org>) to see examples such as the Simpleviewer skin, which creates a beautifully simple Flash-based photo album.

JAlbum is written in Java and there are versions ready to go for Windows, Linux and Mac. It handles all the fiddly

tasks like rescaling photos, creating thumbnails and uploading via FTP — you just pick the design and supply the Web space. Best of all, it's free.

Details

Contact Datadosen
Online <http://jalbum.net>
Price Free

Flickr



Flickr is a software and Web site combo that makes it easy to create a Web photo album. Use the free PC/Mac/Smartphone software to upload up to 20MB per month worth of photos. It allows you to create and organise albums online, and people can leave comments. The pro version gives you 2GB per month of uploads and costs US\$24.95 a year.

Details

Contact Flickr
Online www.flickr.com
Price Basic, free; Pro, US\$24.95



System update tools

VersionTracker Pro



It's like Windows Update for your whole system. The VersionTracker team keeps a catalogue of most software released for Windows, Mac and Palm (but inexplicably



not Linux), while the VersionTracker Pro app scans your system and tells you what needs to be updated. You can keep up to three PCs or Macs updated with one subscription to the update service (or 10 computers with a more expensive subscription).

It's not perfect, but it gets most of the important stuff. The latest version, 3.5, also scans Windows drivers and will advise what needs updating.

Details

Contact VersionTracker
Online www.versiontracker.com/pro
Price US\$49.95

Windows Software Update Services

If you're downloading updates for multiple PCs, you might be wasting download allowance. Microsoft's WSUS lets you download updates on one PC, which becomes a server for all the other PCs downloading updates on the network. It's a server product, so you'll need to get your hands dirty with some configuration.

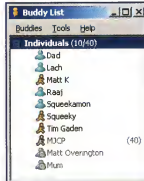
Details

Contact Microsoft
Online www.microsoft.com/windowsserversystem/updateservices
Price Free



Instant messengers

GAIM for Windows



GAIM allows you to chat to IM contacts via the MSN, Yahoo, AOL/IChat, ICQ, Jabber, and even IRC chat networks.

Ported to Windows from Linux, it's lightweight and generally less of a drain on system resources than combined-network messaging programs like Trillian.

The contact window can be "docked" at the side of the screen, and other maximised programs fit in neatly beside it. There's no voice or video chat, but GAIM excels for text chat and it's free of ads and spyware. It's not very skinnable, but you can download smiley packs "inspired" by other IM programs.

Details

Contact GAIM Project
Online <http://gaim.sourceforge.net>
Price Free

Windows Messenger



If you're an MSN Messenger user annoyed by the ads, pop-ups and so on in version 7, consider switching to the program that started it all — Windows Messenger, bundled with Windows XP. It does voice, video and text chat, with none of the screen clutter and extras. The latest version, 5.1, is available for download from Microsoft's Web site.

Details

Contact Microsoft
Online www.microsoft.com/downloads
Price Free



Small business servers

Time for your small business to get its own server?
Nick Race compares seven sub-\$5,000 systems.

seven
SERVERS TESTED

SUB
\$5,000

RATED CRITERIA:

System performance
CPU performance
Storage performance
Upgradeability
Redundancy
Manageability

When a small business grows from a just few people in a room to a larger group sharing an office, the company's IT administrator has a choice. The first option is to stick with the existing peer-to-peer networking arrangement, relying on third parties or ISPs to host email. Only problem is, if a desktop machine stops working, the business risks losing data and suffering through uncontrollable delays.

The second and wiser option is to move to a central server network plan. This is the server/client setup, a popular arrangement which makes data easier to manage. Having users put files in a central location is preferable to spreading them around, especially if they are regularly used by different people. And rather than backing up every client machine, a single backup can be made from the server.

Hosting your own email or Web server decreases the risk of security breaches as networks and clients are easier to manage when running a server-based

operating system. Running a DHCP server for IP allocation (or denial), an SMS server for updates, and restricting access to potentially harmful or dangerous technologies (ActiveX springs to mind) from a central location provides better security and virus cleanup.

That's not to say that switching to a server doesn't also introduce potential problems, such as having a single point of failure when the inevitable crash occurs, although technologies exist in server hardware to reduce the severity of just that issue.

APC Labs sourced seven small business servers aimed at small organisations with a limited budget. What surprised the Labs team is how much the price tags for historically expensive technologies have dropped. A prime example is a hot-pluggable RAID array — even two years ago, this feature added around \$2,000 to the base cost of a server, but today it's standard.



MODEL	PHONE	PRICE	ONLINE	WARRANTY
1. Sun Fire V20z	1800 628 193	\$5,325	www.sun.com.au	3-year next day service
2. Tyan Transport GX280	(03) 9560 7222	\$4,592.50	www.digicor.com.au	2-year return to base
3. Maxtron CSCP-823SATA	(03) 9560 7222	\$4,999.50	www.digicor.com.au	2-year return to base
4. Acer Altos G520	1300 366 567	\$3,849	www.acer.com.au	3-year onsite
5. HP ProLiant ML110	13 23 47	\$1,699	www.hp.com.au	1-year return to base
6. Plus Corp Titan OP250	1800 007 587	\$4,695	www.pluscorp.biz	3-year onsite
7. ASUS AP1710-E1	(07) 3853 5444	\$4,999	www.asus.com.au	3-year onsite

The following systems were submitted for an extended and rigorous testing period:

- Plus Corp provided its Titan OP250, a dual Opteron 250 system based on a Tyan Thunder K8SE motherboard.
- Sun Microsystems stepped up with the Sun Fire V20z, a system with two 248 Opterons installed, and a motherboard based on an AMD chipset.
- Hewlett-Packard, a company with a long history of manufacturing servers, submitted its ProLiant ML110, a Pentium 4 CPU system with a custom Intel E7221-based motherboard.
- ASUS provided the AP1710-E1 through its distributor Cassa. It's a dual Xeon 3GHz machine with a E7230-based system motherboard.
- Acer fronted with the Altos G520, a single Xeon 2.8GHz box, also with an E7230 motherboard.
- Digicor provided two servers: the Maxtron CSCP-8323SATA and Tyan Transport GX280. The Maxtron has dual 2.8GHz Xeon on top of a Tyan S2882 E7520 motherboard. The Transport GX280 is a dual Opteron 246 with a Transport GX28 (B2882) motherboard using the AMD 8131 chip.

Due to product lifecycles, IBM was unable to provide a server for testing. However, APC would like to thank IBM and Netgear for providing equipment that helped in the server testing.

The brief given to the vendors for this roundup asked for a sub-\$5,000 small business server that is flexible, includes management options, and has the potential to be upgraded.

In response, APC Labs received four standalone or pedestal machines (from Acer, ASUS, HP and Plus Corporation) and three rack-mounts (from Sun and the two Digicor machines). Though no preference in terms of form factor was stated in the brief, each type offers advantages and disadvantages.

Rack-mounted servers take up less room and can be effectively paired with network hardware and patch panels for a neat, easily managed solution. Pedestal servers have the advantage of being able to fit more devices inside the box, and extra room for hard disk drives and expansion cards can prolong the lifespan of the hardware. On the downside, having more than one pedestal server can become ungainly and impractical for larger installations.

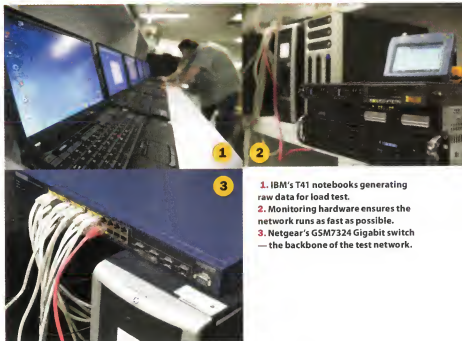
TESTING TIME

CPU performance was assessed using a few choice applications, starting with ScienceMark's Primordia benchmark subset. This single-thread test isn't able to give results across all aspects of CPU performance, but when run using Cesium (Ce) element calculations, it provides an excellent comparative result for memory subsystem and relative CPU floating point performance.

As expected, AMD Opteron-based servers produced the best performance in this test, thanks to the HyperTransport CPU memory controller being much faster than the frontside bus-limited Xeon processor.

MODEL	PRIMORDIA CESIUM	NETBENCH ENT DM	LINPACK	CINEBENCH
Sun Fire V20z	462	307	1,846	872
Transport GX280	512	406	370	451
CSCP-8323SATA	714	507	897	515
Altos G520	840	728	893	584
ProLiant ML110	782	422	680	363
Titan OP250	431	811	1,310	822
AP1710-E1	723.4	423	868	545

Benchmarking showed the dual Opteron servers to be the strongest performers.



1. IBM's T41 notebooks generating raw data for load test.
2. Monitoring hardware ensures the network runs as fast as possible.
3. Netgear's GSM7324 Gigabit switch — the backbone of the test network.

It also emerged that systems with identical processors had different scores in memory throughput and speed because of the RAM and motherboard design.

The Opteron processors immediately demonstrated their strength, with Plus Corp's Titan completing the calculations in seven minutes and 18 seconds, Sun Microsystems' Sun Fire V20z finishing in seven minutes and 42 seconds and the Tyan Transport taking eight minutes and 32 seconds. Bringing up the rear were the Xeon-based Acer and Maxtron servers and the Pentium 4-based HP, all taking longer than 11 and a half minutes to complete the test.

Similar results were found under Linpack (N = 100), which gives a measurement in megaflops. It can be argued that this is a truly artificial benchmark offering no relation to real world performance because of the extremely specific nature of running linear algorithms. Nonetheless, it's a useful method of error checking for more complex benchmarks. Results in Linpack were almost in the same order as those for Primordia (see the table above for easy comparison).

MULTITHREADING PERFORMANCE

Servers typically come with multiple CPUs to reduce overheads when performing calculation or system-intensive tasks. The Cinebench test has

HOW MUCH?

At the conclusion of testing, Sun's V20z server came in at over our price limit. At the time APC was advised, retesting a lower priced machine was impractical. For fairness, we marked the V20z ineligible for an award, though in the end, the extra cost did not equal extra performance.



PEDESTAL SERVER

1. Can typically hold more hard disk drives.
2. Has more room for redundant power supplies.
3. Uses more common components, like half-height optical drives and full-height PCI cards.
4. Generally quieter, cooler and more flexible.



HEAVY LOAD TESTING

Testing a server for its suitability to serve files, Web pages or databases is a tricky task. While many benchmark tests give artificial or estimated performance ratings, the only real way to get a solid understanding of a system's performance is to test it in as near a production environment as possible.

Veritest's Netbench is the standard for this testing method, a client/server setup that mimics network activity from "average" users, ramping up the number of clients until the server has reached its peak. Netbench's original test criteria are a little long in the tooth, so APC created some custom rulesets to get meaningful, modern results with a limited number of clients.

A 12-client network was set up using IBM ThinkPad T41 notebooks with Gigabit Ethernet adaptors. The servers on test also took turns as clients. Binding the network together was the highly capable Netgear ProSafe 24 Port Gigabit L3 Managed Switch GSM7324. After ironing out a nagging issue with the controller notebook being invisible to a client (thanks to a Wi-Fi adaptor, it had two IPs assigned internally) all systems were go.

The test started with a single client reading and writing data onto a shared network drive. This gradually expanded so there were four clients, then six, then eight, and finally all 12 clients bombarding the servers with requests designed to exert stress on the storage of the systems being tested.

All storage was configured for the best performance and data security. If two drives were supplied, RAID 1 was used; if three drives were supplied, RAID 5 was used; if there were four or more drives then RAID 0+1 was used. These configurations ensure data security in the event of disk failure, yet still present the performance benefits of multiple drives. Only the Sun server was provided with a single drive, so no RAID options were used.

The highest consistent throughput came from Plus Corporation's Titan OP250. A steady throughput of 811Mbit/s is excellent for a Gigabit Ethernet adaptor, let alone a server under load. The system's four-disk 0+1 RAID configuration helped it shine. Behind it was the Maxtron C5PC-8235ATA, configured with six hard disks in a RAID 0+1 array, managing 507Mbit/s — about what was expected for most servers in the roundup.

Close behind was Digicor's Tyan Transport, its disks configured as RAID 1. Next was the ASUS, scoring 423Mbit/s using a RAID 5 of Seagate Ultra320 SCSI drives. HP's ProLiant ML110 scored only one point lower with a RAID 1 array of two Seagate SCSI 320 80GB drives.

Only the Acer and Sun units failed to achieve scores over 400Mbit/s — 289Mbit/s (two Seagate U320 drive array) and 397Mbit/s (single disk only) respectively.

FUTURE EXPANDABILITY

Buying a server that fulfils your immediate needs is only satisfying in the short term. Any growing business needs an infrastructure to grow with it, so this was

RACK-MOUNTED SERVER

1. Consolidates servers nicely.
2. Can be paired with rackable network equipment.
3. Makes power and network cable management much neater and easier.
4. Generally louder and hotter.



rack or stack

Which way do you go?

Rack-mounting your equipment makes a lot of sense.

Consolidating server and network hardware into a single place makes managing the infrastructure easier, if harder to initially plan. On the flip side, pedestal servers tend to be much quieter and won't involve the expense of purchasing extra cooling, power and the rack itself.



a module dedicated to multiple-threaded image rendering. The rendering is almost entirely dependent on CPU and memory subsystems, so it offers a good comparison of performance with multithreaded applications and performance under load.

Plus Corporation's Titan OP250 came out on top in this test with a result of 622, ahead of the Sun Fire V20z by 40 points. The HP ProLiant ML110 came in second last with 303, due to its single (Hyper-Threaded) Pentium 4 solution. The Acer Altos G520 took last place with a score of 284.

REAL WORLD
TESTING

Keeping the network running at full capacity for a number of days took close attention from the Lab team.

taken into consideration when evaluating just how far a system could be expanded down the track.

Bar the Hewlett-Packard system, all servers were specced with two CPUs, so adding another CPU for a little extra grunt wasn't an option. However, the recent release of AMD's dual-core Opteron 275 means extra CPU cores are an upgrade path for all Opteron-based systems.

Intel has announced the development of a dual-core Xeon processor (codenamed Paxville), but it won't make an appearance until the first quarter of 2006. The Acer Altos G520 was shipped with a single CPU, so a direct upgrade path to a dual CPU or dual dual-core setup should be in the works.

Additional disks can be added to the ASUS, HP, Acer and Sun for more storage (or extra data protection in the case of the Sun) without major OS surgery, RAID shenanigans or re-installation nightmares. All servers in the roundup can immediately be upgraded with

THE difference

PC HARDWARE

SERVER HARDWARE

Storage	Serial ATA or Parallel ATA. Includes no redundancy in case of failure.	Serial ATA or SCSI almost exclusively configured as a RAID (Redundant Array of Independent Disks).
CPU	Single processor using either AMD Athlon or Intel Pentium chips.	Single or multiple processors using either AMD Opteron or Intel Xeon chips.
Networking	Single or double 10/100 or Gigabit Ethernet adaptors.	Single or double Gigabit Ethernet adaptors and management ports.
Chipsets	Built for speed, graphics and integration.	Built for stability, speed and flexibility.
Graphics	Integrated or add-on graphics adaptors including 3D functionality.	Extremely basic and low-performance integrated graphics.
Form factor and cooling	Typically smaller cases with limited expandability, designed for sitting on a desk. Attention paid to keeping sound levels low with large, slow fans.	Either thin for saving space, or large for disk storage. Rarely any concessions made for system noise levels.
Power	Single, high-powered, general purpose PSU.	Numerous hot-pluggable and finely matched power supplies for continuous running after a failover.

more RAM — either with additional sticks or higher density modules being swapped in. The Maxtron and Plus Corporation machines were already loaded to capacity, so adding extra storage directly into the box would be troublesome.

REUNDANCY

It was pleasing to see that a couple of the servers came with redundant power supplies. This is an important consideration when you depend on a server to run your business since one of the most common points of failure of any PC system is the power supply. The Maxtron's 2U rack-mount featured two 600W hot-swappable power supply units (PSUs) with automatic failover, while the ASUS came with three for a seriously bad power day.

The Sun Fire V20z gets a panning in this department. The PSU isn't user-replaceable, meaning that in the event of a power failure, a Sun representative has to pay a house call to get the juice flowing again.

Beyond PSUs, the only redundancy in place in these servers is hot-swap SCSI or SATA bays. It's great to see all the servers offer some kind of redundant functionality as standard.



If your server room looks like this, maybe it's time to invest in a rack.

OS WARS

Choosing an appropriate operating system for a business server can be a difficult process. Microsoft Windows Small Business Server is cost effective compared with Windows Server plus add-ons, but has limits as to how many processors and clients the server is allowed to support. Going open source is another option, most often cheaper, but software packages and support can be a minefield for a less experienced or Windows-centric administrator.

SERVER MANAGEMENT

Setting up a server is one thing, managing it is another. At this price point you can't expect miracles when it comes to server management functionality, remote or otherwise, but there were a couple of surprises.

Firstly, the Sun Fire V20z provides out-of-band management with heavy OS hooks by dedicated 10/100 ports on the back. This means that a server that has failed to boot, been shut down or is suffering from a hardware fault can be managed while it's still offline. It's fantastic functionality for a system in a large server farm, but probably unnecessary for a small business. However, it's still amazing to see this technology trickling down. SNMP support rounds it off.

ASUS bundled its ASUS Web-based Management (ASWM) software package with its system. Though it's only usable when the server is running, it provides an in-depth look at the system's health and is accessible via the network.

The HP ProLiant ML110 also impressed with its remote admin functionality, called Integrated Lights Out (iLO). This lets the user turn the machine on or off, control power usage through different models, and enable a virtual LAN-based serial interface into Windows Server 2003 for emergency situations.

Acer bundles its Server Manager software with the Altos G520, which enables monitoring of networked machines via the Web. Built into this is Remote Diagnostic Manager for troubleshooting the Acer server from another PC or server on the same LAN.

THE TEST DRIVE

The APC Labs team kept careful notes while setting up the machines. To increase the realism of the testing, any bundled OSes were wiped and Windows Server 2003 was installed on each machine. This way the ease of installation, driver issues and install processes could be evaluated.

With its EasyBUILD software, the Acer Altos G520 had an excellent setup management system.

After inserting the EasyBUILD CD, some floppies and the OS media CD, the EasyBUILD application installed the operating system, loading the correct drivers and system management software.

The Sun Fire V20z has a very similar setup system called the Installation Assistant CD. While it didn't support Windows 2003 at the time of writing, drivers are available on the Web.

HP's system installed without a hitch, as did those from ASUS, Tyan and Maxtron. Plus Corp's Titan machine originally had issues starting its network interfaces, but a little driver tweaking and a download from the Broadcom Web site had it ticking over in no time. Overall, the installation for each server transpired without any major hiccups.

BRASS TACKS

Each unit had different strengths and weaknesses. Unique strengths included the svelte stylings of the Tyan Transport, the six-drive array of the Maxtron C5PC-B23SATA, the excellent management features of the Sun Fire V20z, the redundancy in the ASUS, the raw grunt of the Plus Corp Titan and the superior install and management of the Acer Altos.

But no machine was perfect. The Tyan Transport only has two disk drives, the Sun Fire V20z just the one. The Maxtron, for all its processing power, was a moderate performer that never distinguished itself. HP's ProLiant has a single, non-server grade CPU, while the Acer's performance was poorer than expected.

Plus Corp's Titan OP250 stood out thanks to its superior performance, cutting edge technology and excellent value for money. Gone are the days when a server had to be from the big four (Sun, HP, IBM or Dell) to be considered a wise purchase. The Titan OP250 offers a good balance of performance and redundancy.

It isn't perfect, but the Titan only left APC with a wish list of upgrades rather than glaring omissions. It was extremely fast, had enough disks for a trustworthy



RAID configuration, 2GB of registered ECC RAM and two superb Opteron processors. For a small business running its own network services, database or email server, the Titan OP250 will perform the task admirably.

In terms of sheer bang for your buck, the HP ProLiant ML110 earns the Best Value award with its stunningly low price tag. Of course, it only offers a single processor with no real upgrade path in this realm. If you don't

expect your power needs to increase in the foreseeable future, the ProLiant is a fair choice. However, its lack of flexibility is reflected in its final score. The Maxtron CSPC-823SATA earns the Highly Recommended award for its solid performance, storage capacity and space-saving form factor. The addition of some third-party management software will bring the unit into line with the best products in the roundup. **ETC**

	SUN FIRE V20Z	TYAN TRANSPORT QX280	MAXTRON CSPC-823SATA	ACER ALTOS G520	HP PROLIANT ML110	PLUS CORP TITAN OP250	ASUS AP1710-E1
CPU	Dual Opteron 248	Dual Opteron 246	Dual Xeon 2.8GHz	Single Xeon 2.8GHz	Single Pentium 4 3GHz	Dual Opteron 250	Dual Xeon 3GHz
Chipset	AMD 8131, 8111	AMD 8131, 8111	Intel E7520	Intel E7230	Intel E7221	AMD 8131, 8111	Intel E7230
RAM	2GB	2GB	1GB	2GB	1GB	2GB	1GB
Storage hardware	1x Seagate Ultra 320 73GB	2x W0 JB1200 120GB	6x W0 JB800 80GB	2x Seagate Ultra 320 73GB	2x Maxtor Diamond Plus 9 80GB	4x W0 JB1200 120GB	3x Seagate Ultra 320 36GB
Storage config.	68.3GB	RAID 1, 111GB	RAID 5, 298GB	RAID 1, 68.3GB	RAID 1, 73.2GB	RAID 0+1, 223GB	RAID 5, 68.3GB
Ethernet adapters	2x Broadcom NetXtreme Gigabit, 1x Intel NetWise	2x Broadcom NetXtreme Gigabit, 1x Intel PRO/100S	Intel PRO/1000MT	Intel PRO/1000MT	Intel PRO/1000MT	2x Broadcom NetXtreme Gigabit	2x Broadcom NetXtreme Gigabit
OS support	Solaris, RHEL, Windows Server 2003	Linux, Windows Server 2003	Linux, Windows Server 2003	Linux, Windows Server 2003	Linux, Windows Server 2003	Linux, Windows Server 2003	Linux, Windows Server 2003
RAID controller	LSI Logic PCI-X Ultra 320	SI 3114	Arcra 1120	LSI Logic PCI-X Ultra 320	Adaptec 2610SA	NVIDIA nForce Professional	LSI Megaraid 320-1
Hard drive bays	2	2	6	4	4	4	8
RAM slots	8	8	8	8	4	8	4



Best value	7 th	5 th	3 rd	6 th	1 st	2 nd	4 th
✓	Excellent management options.	Solid 1RU with plenty of power.	Plenty of storage and power in a small space.	Great case design.	Good performance for a budget server.	Excellent performance.	Plenty of spare drive slots.
✗	Limited storage options.	Limited storage options.	No management.	Under-performer.	Unable to be upgraded to dual processor, limited RAM expansion.	Unproven chipset.	Extra RAM expansion would be ideal.
Verdict	★★★★☆	★★★★☆	★★★★★	★★★☆☆	★★★★☆	★★★★★	★★★★★



DVD authoring software

Ashok Zaman burns through DVD authoring apps designed for varying levels of experience.

Consumer-level authoring packages are moving towards all-in-one style offerings. They have a broader range of editing features that are more closely integrated with the authoring process of the disc.

This Labs Challenge tests seven DVD authoring packages catering to users with a range of skill levels and needs. Although it doesn't strictly meet this criteria, Adobe's professional-level Encore DVD 1.5 is also included to show how it differs from consumer apps.

EDITING OR AUTHORING?

Producing a DVD with a few video files is simple. Drop in the clips you want, add transitions, mark the chapters, then trim and splice the source files. Planning and arranging the disc's navigation and structure, designing menus and buttons, and adding background images and audio is also straightforward, but takes time. Finally, link the video files and hit burn.

Some packages, such as Ulead's DVD MovieFactory 4, adhere closely to this model, while others focus on authoring and menu-building. Pinnacle Instant VideoAlbum, Sonic MyDVD and SlideShow, on the other hand, have stripped-back editing

features which are included only as side options.

DVD MovieFactory 4 integrates editing and authoring very closely. Suites such as Roxio's Easy Media Creator 7.5 and Ahead Nero 6 Reloaded take a more modular approach, with a plethora of functions available for manipulating video, audio and image files. They also have the familiar layout and interfaces of their respective CD burning utility suites. On the other hand, CyberLink PowerProducer 3 itself has very basic editing features, but the bundled PowerDirector Express provides deeper editing functionality.

Adobe Encore DVD 1.5's GUI similar is to Photoshop and Illustrator, and is dedicated to the authoring and production phase of a project. Designed to work in conjunction with a standalone editing suite such as Adobe Premiere, it also integrates closely with Photoshop for designing and importing the images which make up the DVD's menu interface.

EASE OF USE

Since the main focus of this Labs Challenge is consumer-end packages, ease of use is arguably the most important criteria. Both Nero 6 Reloaded and Easy

seven
PACKAGES TESTED

RATED CRITERIA:

Ease of use
Format support
Editing features
Menu creation
Rendering
Burning

1 2 3 4 5 6 7

THE
players

PRODUCT	VENDOR	PHONE	PRICE	ONLINE
1. Adobe Encore DVD 1.5	Adobe	1300 550 205	\$571	www.adobe.com.au
2. Ulead DVD MovieFactory 4	Lako Pacific	1800 657 601	\$99	www.lakopacific.com
3. Roxio Easy Media Creator 7.5	H-Digital	(02) 9502 6565	\$170	www.h-digital.com.au
4. Nero 6 Reloaded	Communique	(02) 9622 5624	\$199	www.comm-unique.com.au
5. CyberLink PowerProducer 3 Deluxe	Manacomm	(07) 3331 5999	\$119.95	www.manac.com.au
6. Sonic MyDVD and SlideShow	H-Digital	(02) 9502 6565	\$90	www.h-digital.com.au
7. Pinnacle Instant VideoAlbum	Lako Pacific	1800 657 601	\$99	www.lakopacific.com

Media Creator 7.5 offer a broad array of digital media tools and applications.

Nero takes a wizard-like path, guiding you from the editing workspace to the chapter selection and menu creation interfaces. Easy Media Creator keeps the creation of the project separated between its VideoWave 7.5 and DVD Builder applications. Each step in Easy Media Creator, from importing the videos to producing menus, was convoluted and clunky — even if VideoWave 7.5 and DVD Builder are comparable to Nero in functionality and features.

Integrating tightly with other Adobe apps, Encore DVD 1.5 handles image files for menu templates and backgrounds as Photoshop files. This means files can be easily transferred between the two programs, giving you complete creative control over a project. If you're familiar with Adobe applications, you should have no trouble working with Encore DVD. If not, the learning curve is pretty steep.

Ulead's DVD MovieFactory 4 was the most user-friendly program in the roundup. It has a welcoming interface and tightly integrates simple but effective editing features with the authoring process. Chapter selection, editing tools, menu design and creation options are all easy to access.

CyberLink PowerProducer 3 refused to install on the test machine (see "How we tested", right), but ran well on a Dell Inspiron 8500. It offers only basic functions to merge, split, or cut source files. The bundled CyberLink PowerDirector Express app has more advanced editing options, including scene transition effects, a familiar editing interface, preview screen and a timeline or storyboard view across the bottom.

The most simplistic packages are Pinnacle Instant VideoAlbum and Sonic MyDVD and SlideShow. Instant VideoAlbum displays its four workflow steps (Import, Select style, Preview and Burn) in large, friendly text.

Sonic MyDVD and SlideShow has a similar feel to

PRODUCT	FIREWIRE	USB	ANALOG
Ulead DVD MovieFactory 4	✓	✓	✓
Roxio Easy Media Creator 7.5	✓	✓	✓
Nero 6 Reloaded	✓	✓	✓
CyberLink PowerProducer 3 Deluxe	✓	✓	✓
Sonic MyDVD and SlideShow	✓	✗	✓
Pinnacle Instant VideoAlbum	✓	✗	✗

A range of video capture options are offered.

Microsoft Paint, with a large central display and file import, capture, slide and menu options located the left. Editing options sit on the top of the interface, but annoyingly, they are only enabled on upgrade.

VIDEO SUPPORT

Not every package in this roundup accepted the selection of video files used in testing. Several apps experienced problems with QuickTime.

PowerProducer wouldn't accept the QuickTime file, though it could be imported into PowerDirector and passed on following conversion into MPEG format. Similarly, Instant VideoAlbum didn't accept QuickTime (and offered no alternatives) or DivX3, only supporting MPEG-1 and 2, DivX 5 (MPEG-4), and raw AVI codecs.

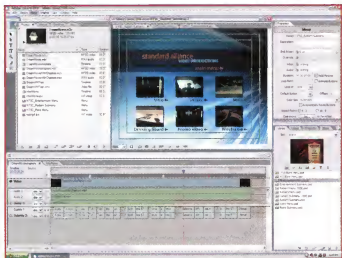
Getting started with Encore DVD 1.5 was a little difficult because it's strict regarding the video files it accepts in its project window. While it recognised each of the file formats, they all had to be encoded under the same standard (PAL or NTSC), and screen resolutions and video frame rates had to be fixed.

Nero 6 Reloaded offers the best authoring support, allowing you to customise edited videos for export into MPEG-1 and 2. It also has support for MPEG-4, adjustable aspect ratio, resolution size, video frame rate and audio compression, ranging from no compression to Nero Digital Audio for NTSC/PAL, MP3, WMA, PCM and even GSM or CQTT formats native to phone communication. This far outstrips its closest rival, Easy Media Creator 7.5, which allows only fixed resolutions and bitrates for DVD (MPEG-2), or VCD (MPEG-1) burning.

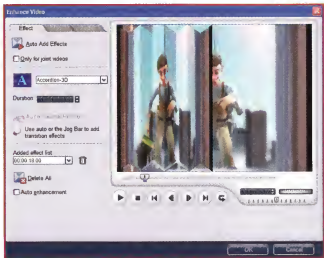
HOW WE TESTED

The software (except for CyberLink PowerProducer) was installed on an HP Compaq nc8230 notebook with a 1.73GHz Pentium M 740 processor, 512MB of RAM, a 40GB hard drive and Windows XP SP1.

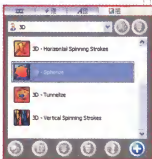
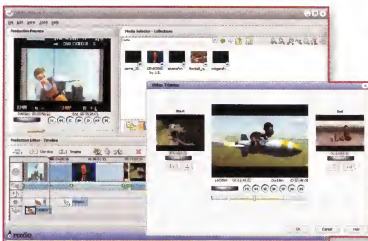
Testing was performed with clips in MPEG-1, raw AVI, QuickTime (linear transcoding), DivX 3 and DivX 5. When an app failed to import the test file, a backup file in the same format was used in its place. Each app was used to: Import the clips; create a DVD project for editing and authoring; splice each test file together into one clip; trim them; add transitions and effects; create a menu and navigation system for the DVD; render and transcode the finished project to a file or DVD format for burning.



Adobe Encore DVD 1.5: dedicated to authoring and production of a DVD project.



Ulead DVD MovieFactory 4 offers a good range of effective editing tools.



(Clockwise from top left) The main menu screen in Nero is clear and intuitive, reminiscent of the Burning ROM app.

A detail of Roxio's workspace.

Nero's storyboard feature.

All programs in the roundup support video capture. Ulead's DVD MovieFactory 4 captures DV in DV-Type 1 and 2 (a raw DV AVI stream, and split audio and video streams respectively) via FireWire or USB. It can even capture analog from VHS or TV with the right DVB-T card installed, and has options (including a slider) to set the quality level of the stream.

Nero 6 Reloaded isn't quite as flexible as it lacks a DV-Type 1 option, although Easy Media Creator does (labelled DV Video and MPEG-2). Capture in Instant VideoAlbum is limited to DV via FireWire, again making it the most limited. Even Sonic MyDVD and SlideShow has better options for DV and analog capture, but can't import video directly from DVDs.

EDITING AND MENU CREATION

The standout editing package is Roxio Easy Media Creator, followed closely by Nero 6 Reloaded and DVD MovieFactory 4. Easy Media Creator, like Nero and PowerProducer, allows you to switch between storyboard and timeline views. It also offers separate timeline tracks for visual effects, transition effects, audio, sound effects, narration, text and overlays.

While not quite matching Easy Media Creator's level of functionality, PowerDirector, Nero 6 Reloaded and DVD MovieFactory 4 all offer scene transition effects and the ability to add an audio track.

In a professional environment, Encore DVD's Timelines tab allows all assets to be arranged along a timeline. From here you can add multiple audio tracks, stills and subtitle tracks, and control their start and finish points. Each track can be linked to a menu button, making it easy to switch subtitle tracks, dubbed audio and dialogue on or off.

Instant VideoAlbum and Sonic MyDVD and SlideShow have straightforward menu creation tools. The main work screen presents you with an image of how the DVD menu will appear—with an editable title at the top, and the starting frames of the video files presented as the buttons.

However, Instant VideoAlbum offers some simple editing and marking of chapters in the Preview phase of its four-step workflow. Files are displayed as thumbnails in the asset list and can be expanded to display a list of scenes. These are automatically

selected by the program and can be set as chapters with the click of a button.

The packages with more editing features provide plenty of freedom. CyberLink, Roxio, Ulead and Nero offer automatic chapter creation, but also allow manual chapter marking. You can merge videos or split them into smaller clips, then assign chapters to any of the clips. Multiple clips can have multiple chapters, providing title menu items with sub-menu items for the chapters within each clip.

The bulk of Encore DVD's workflow takes place in the project window, where assets such as video, audio

	SUPPORTED formats	
	VIDEO INPUT	VIDEO OUTPUT
Adobe Encore DVD 1.5	AVI, MPEG-2, MOV	MPEG-2
Ulead DVD MovieFactory 4	AVI, MOV, DivX, WMV, DVD-Video, DVD+VR, DVD+VR, MPEG-1, MPEG-2, DV AVI, AVI, DAT, VOB	MPEG-1, MPEG-2, AVI, WMV, MOV
Roxio Easy Media Creator 7.5	DV, AVI, MPEG1/2, DivX, WMV, ASF, MOV	DV, AVI, MPEG1/2, DivX, WMV
Nero 6 Reloaded	AVI, MOV, DivX, WMV, DVD-Video, DVD+VR, DVD+VR, MPEG-1, MPEG-2, DV AVI, AVI	MPEG-1, MPEG-2, DV AVI, AVI
CyberLink PowerProducer 3 Deluxe	AVI, DivX, WMV, DVD-Video, DVD+VR, DVD+VR, MPEG-1, MPEG-2, DV AVI, AVI, DAT, VOB	MPEG-1, MPEG-2, AVI, WMV, DivX, MOV, RV
Sonic MyDVD and SlideShow	AVI, MOV, DivX, WMV, MPEG-1, MPEG-2, DV AVI, AVI	MPEG-1, MPEG-2
Pinnacle Instant VideoAlbum	AVI, DivX, MPEG-1, MPEG-2, DV AVI, AVI	MPEG-1, MPEG-2



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DVD Dual Combo (DVD± CD-RW) Drive
Built-in Camera



MEDIA CENTRE

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Intel® Celeron® Processor 2.8GHz
128MB ATI Radeon 9700 graphic
17" 1440x900 WXGA display
256x512/1024MB DDR Memory
40/60/80/100GB HDD
DVD Dual Drive
Built-in Camera

PERFORMANCE



G556

Intel® Pentium® M 755 Processor 2.0 GHz
Intel® Celeron® M 340 Processor 1.5GHz
128MB ATI Mobility Radeon 9700 graphic
15" 1400x1050 SXGA+ display
256x512/1024 MB DDR Memory
40/60/80/100GB HDD
DVD Dual Drive
Windows® XP Home Edition

ALL ROUNDER

D43EF

Intel® Pentium® 4 Processor 3.2GHz
Intel® Celeron® Processor 2.8GHz
15.1" 1024x768 XGA display
256x512/1024MB DDR Memory
40/60/80/100GB HDD
Combo (DVD±CD-RW) DVD Dual Drive
Built-in Camera



SCHOOL WORKS

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40GB HDD
Combo (DVD±CD-RW) DVD Dual Drive



64 - BIT POWER

D410J

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Mobile AMD® Sempron® 62W 2800+ Processor
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256x512/1024MB DDR Memory
40/60/80/100GB HDD
Combo (DVD±CD-RW) DVD dual drive
Built-in Camera



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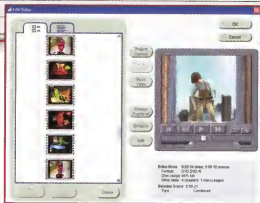
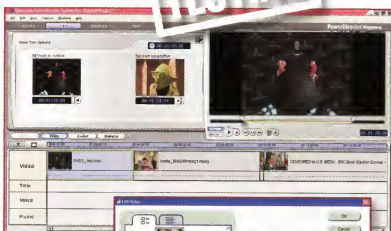
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(Clockwise from top left) Sonic MyDVD has a clear, simple user interface.

CyberLink's PowerDirector Express has advanced editing options.

The editing features of Pinnacle Instant VideoAlbum are very basic.



and still images are imported. From there you move to the Menus tab to design and implement the navigation system. That's where the tabbed palettes come into play. They offer an extensive library of images for buttons and backgrounds, text editing via the Characters tab, and styles for adding unique touches to visual elements in your DVD menus.

The Layers tab allows you to create, view and modify all your menu layers — managing multiple nested menus — a feature consumer packages can't perform. Chapter points can be manually assigned, but Encore DVD also uses timecode markers (inserted in AVI and MPEG-2 files exported from Adobe's Premiere Pro 1.5 and After Effects 6.5) to assign chapters.

DVD MovieFactory and Easy Media Creator have the edge when it comes to the look and feel of the finished DVD. Both permit you to insert and nominate an intro clip leading up to the title screen, and offer a great range of pre-made still and video templates for menu backgrounds. Nero 6 Reloaded has no pre-made backgrounds at all.

Animated buttons are available in all packages except Instant Video Album. All suites permit the use of video clips as menu backgrounds and audio import. Instant Video Album and PowerProducer also offer a selection, but DVD MovieFactory shines thanks to its selection of video and still options, background music, and an incredibly easy creation process.

RENDERING AND BURNING

Each package gives previews of the finalised project before committing it to file or disc. Encore DVD 1.5 has an ongoing project-checking feature which shows previews as it's built, and lets you customise and save your preferred workspace layout. (The consumer packages allow this by simply permitting you to go back and forth in the workflow steps.) Other professional touches include adding region coding and copy protection.

Burning is as simple as pressing a button in Instant Video Album and Sonic MyDVD and SlideShow, but others offer a few alternatives. DVD MovieFactory lets you change resolutions, switch between 4:3 and 16:9

aspect ratios, quality settings for compressing into MPEG-2, Dolby Digital or MPEG encoding for audio. The Normalise audio checkbox prevents irregularities in audio levels between different video sources.

CyberLink PowerProducer's opening dialogue lays out the options: 1.4GB, 4.7GB, and Double Layer support on 8.5GB discs. You can also choose VCD, SVCD, DivX, DVD±R/RW and DVD-RAM formats.

After customising and exporting your footage in Nero 6 Reloaded, a summary of your title clips with video mode, aspect ratio, resolution and quality is displayed. A few extra options exist for the overall disc, such as adjusting aspect ratio, quality, bit rate and audio format before burning to a DVD, CD, image file or copying to a folder on your hard drive.

Like Easy Media Creator, Nero supports 8.5GB DVDS and DVD±RW, though with less flexibility. It fixes resolutions and bitrates to standardised quality settings, from Low (MPEG-2, 352 x 240, 4Mbit) to Best (MPEG-2, 720 x 480, 9Mbit). Then you can burn, save an image to your hard disk, or both.

THE VERDICT

Among the authoring suites on test, three stood out as top consumer offerings. Ulead DVD MovieFactory is easy to use, and offers a small but effective arsenal of editing tools and video output options. While it has a similarly intuitive user interface to Sonic MyDVD and SlideShow and Pinnacle Instant VideoAlbum, it has the ability to do so much more than those apps.

The other two excellent packages are Roxio Easy Media Creator 7.5 and Nero 6 Reloaded which have a comprehensive suite of utilities for manipulating

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LABS CHALLENGE

digital media, offer powerful tools for editing, menu building, and authoring, and are relatively easy to use. Each has its pros and cons — while Easy Media Creator's VideoWave editor has more options and functionality, Nero has a more efficient user interface and greater output options for exporting.

However, Roxio Easy Media Creator 7.5 takes the Editor's Choice award due to its comprehensive editing features and effects, and the quality of the finished DVD project.

Adobe Encore DVD 1.5 is clearly a very different beast, a dedicated professional suite offering a depth of functionality and features far beyond the consumer applications. But while it provides greater creative control over every element of producing a DVD project, a dedicated professional suite is best employed when importing video sources that have already been edited and prepped by an editing suite — overkill for the average home project. **ETC**

	ADOBE ENCORE DVD 1.5	ULEAD DVD MOVIE FACTORY 4	ROXIO EASY MEDIA CREATOR 7.5	NERO 6 RELOADED	CYBERLINK POWER-PRODUCER 3 DELUXE	SONIC MYDVD AND SLIDESHOW	PINNACLE INSTANT VIDEO ALBUM
Create DVD/VCD/SVCD/Mini-DVD	✓/✓/✓/✓	✓/✓/✓/✓	✓/✓/✓/✓	✓/✓/✓/✓	✓/✓/✓/✓	✓/✓/✓/✓	✓/✓/✓/✓
Video editing							
Storyboard	✓	✓	✓	✓	✓	✗	✗
Timeline	✓	✗	✓	✓	✓	✗	✗
Split, trim and splice video	✓	✓	✓	✓	✓	✗	✗
Chapter select auto/manual	✓/✓	✓/✓	✓/✓	✓/✓	✓/✓	✗/✗	✓/✗
Scene transition effects	✓	✓	✓	✓	✓	✗	✗
Video effects	✗	✗	✓	✓	✗	✗	✗
Menu creation							
Background image templates	✓	✓	✓	✗	✓	✓	✓
Video background presets available /import video	✓/✓	✓/✓	✓/✓	✗/✓	✓/✓	✓/✓	✓/✓
Animate buttons	✓	✓	✓	✓	✓	✓	✗
Title menu/chapter menu/other	✓/✓/✓	✓/✓/✗	✓/✓/✗	✓/✓/✗	✓/✓/✗	✓/✓/✗	✓/✓/✗



Best value	Not included as it's a professional app.	1 st	2 nd	6 th	5 th	4 th	3 rd
✓	Full-featured, professional DVD authoring suite; offers a very high degree of creative control.	Combines incredible ease of use with a well-integrated set of editing and authoring features; perfect for beginners.	Excellent editing and authoring features; broad range of complementary digital media tools and applications.	Wizard-like user interface; outstanding video output options plus extra digital media apps and tools.	Simple user interface complemented by the addition of PowerDirector Express; good range of output options.	A very basic package that's easy to use; nice library of backgrounds and images.	Simple to use four-step workflow with lots of automated functions.
✗	Steep learning curve for beginners; works better in conjunction with dedicated video editing suite.	Not as feature-packed as other offerings; lacking the editing options of Roxio Easy Media Creator 7.5.	User interface is a little convoluted; relatively limited video output options.	A little lacking in authoring options, such as image and background libraries.	Will not accept QuickTime files; some installation issues; lacking in editing features.	Various functions (such as editing) disabled without the upgraded version.	Lack of manual control; no QuickTime or DivX3 support; very rudimentary editing features.

Verdict ★★★★★ ★★★★★ ★★★★★ ★★★★★ ★★★★★ ★★★★★ ★★★★★



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Sweet spot upgrades

What's inside

Monitors, page 77

Dan Chiappini selects displays to rival your home cinema setup.

Optical drives, page 78

Nick Race offers two quality removable storage options.

Networking, page 80

Stephen Withers upgrades to a gigabit router.

Gaming, page 82

John Gillooly chooses the best components for giving your rig a gaming-focused facelift.

Media centre, page 83

John Gillooly shows how to get an all-in-one home cinema setup.

Digital video, page 84

Seamus Byrne gets you set up to make memorable video.

Hard drives, page 86

Nick Race knows the best products for a storage upgrade.

Notebooks, page 87

It's a DIY upgrade for Dan Warne.

Cheat sheet, page 88

John Gillooly breaks the process down into bite-sized pieces.

The sweet spot is the place where price and performance are in perfect harmony. APC identifies the ideal upgrade components.

Most tech-savvy people know that when it's time to upgrade your computer, the cheapest components aren't necessarily the best. Performance is a key concern, but so is value for money — the perfect combination of hardware and software which hits the so-called "sweet spot".

The APC Labs team — John Gillooly, Dan Chiappini and Nick Race — selected the key computer components which are upgraded whenever a PC needs a new lease of life and identified the brands and models that best combine performance with price. Dan Warne, Stephen Withers, and Seamus Byrne also contributed.

But this is also about identifying the best possible gear, whatever the cost. So in most categories, a "dream component" was selected in addition to the sweet spot product.

Before rushing out to buy these components, remember that upgrading has its traps. Aside from the actual process of installing the hardware, you need to ensure the new parts work with your PC's existing technology. With constant CPU socket shuffling, memory changes and a new PCI architecture, mixing and matching new and old technologies may be supported in some cases, but this tends to be the exception rather than the rule.

This upgrade guide has been created for relatively recent PC platforms, with the upgrades tailored for

specific uses. A "cheat sheet" is also included for quickly and easily identifying common sockets and devices to help you determine the vintage of your RAM, CPU and so on.

In order to select the component which will have the most beneficial effect on your system's performance, APC recommends you be as specific as possible when identifying the reasons for the upgrade. "The computer is running too slow" is a relative term, and can often be addressed through the judicious selection of one upgrade part as opposed to several.

A performance diagnostic application such as Windows XP's *perfmon* can help. If the average disk queue in *perfmon* is constantly maxed out, a faster hard drive is needed. On the other hand, having no free RAM when running the most common applications means that you need to increase the amount of memory.

In some cases, upgrading is not always the best plan of action. A system more than a few generations old may benefit from a little more RAM or a new hard drive, but once CPUs are no longer freely available it takes major surgery and deep pockets to get a system back up to scratch. Indeed, if you're planning to replace most of the parts in the PC, buying a new computer is probably the best course of action. But if your PC is less than three-years-old, these sweet spot upgrades can seriously improve performance.

Monitors

While the monitor helps you directly interact with your PC, it's usually the last component to be upgraded. However, monitor technology has advanced so dramatically that CRTs are rapidly being replaced by flat panel screens. There are different monitors for different uses, but some currently represent better value than others.

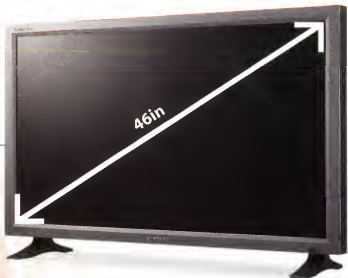
SWEET SPOT SCREEN

Gigabyte 19in GD-1903DP — \$699

CRT technology is on its last legs and the LCD has taken off in a huge way. This is due to its combination of rapidly declining prices and greatly improved performance.

The initial problems of LCDs, such as phase control, dead pixels, slow response times and inconsistent colouring, are now largely ironed out. For instance, pixel response times have dropped from over 25ms to below 8ms in less than 18 months. Increased sales have also brought many more suppliers into the market.

If 17in LCD monitors were the must-have product of last year, they have now been overshadowed by the introduction of 19in displays. These have dropped from around \$1,000 at the end of 2004 to an average of \$600 (add another \$100 for something in the 8ms range). Gigabyte's GD-1903DP gets the nod for its good contrast ratio and impressive performance, which earned it an Editor's Choice award earlier this year (APC January, page 57).



DREAM SCREEN

Samsung 460PN — \$12,999

When money is no object, APC recommends Samsung's 46in LCD, at a mere \$12,999. For this price, you'd expect top-of-the-line and this monitor's 800:1 contrast ratio and 500cd/m² brightness levels don't disappoint. It's a wide-screen panel, with maximum resolutions of up to 1,366 x 768 and 8ms pixel response rate. Gamers, start drooling!

To meet the high expectations of its enthusiast user target market, the display has DVI, D-sub, S-Video, USB, RJ45 and BNC inputs for connecting various other devices. If you've got the money to spare, you'd be hard pressed to find much better in large screen LCD technology. Playing Half-Life 2 on a display this size will make you the envy of all your friends. Just make sure you don't sit too close!

Pixel response times

Gamers: since fast response times are vital in a frag-fest, gamers should look for sub-16ms displays. Many of the major manufacturers are now selling panels faster than 8ms, solving ghosting problems, and they're ideal for FPS games. Just be prepared to take a quality hit with the 1,280 x 1,024 maximum native resolutions on 17 and 19in units.

Business: whether for a SOHO or enterprise, LCDs reclaim desk space. Given that office productivity applications aren't whizzing by at 60fps, it's unlikely you'll notice the difference in performance between LCD and CRT — unless you're gaming after hours.

Home: users wanting to play games and watch DVDs should look for a panel with a refresh rate below 16ms. Whenever possible, try before you buy.

Dan Chiappini

TECHNOLOGY ON THE HORIZON

LCD technology allows manufacturers to create thin, light and portable monitors for a range of devices, but there's better to come. Organic Light Emitting Diode (OLED) development continues to impress. The fact that it doesn't need a backlight results in a dramatic reduction of power consumption, fewer part failures and a longer operating lifetime. An even more radical development, Flexible Organic Light Emitting Diode (FOLED), opens the door to future tech devices such as "newspapers" which could be rolled up and put in your pocket.

However, it's not all smooth sailing with OLED. Since it uses organic components, the polymers that make up pixels have a tendency to rot.

Given the energy efficiency, long life span, high resolution and potentially better manufacturing yield rate of OLEDs, they're a good candidate to replace LCDs in mobile phones and PDA screens, as well as televisions and any other electronic device which currently relies on a backlight LCD panel.

One OLED-based product is Samsung's 40in OLED television, due for release some time in late

2007. It features a wide-screen, HD-ready panel and boasts a 600nit maximum screen brightness and 1,280 x 800 resolution — imagine watching DVDs, playing your favourite game or inputting data into spreadsheets on that!

Size isn't everything, but the Samsung OLED is less than 3cm deep, making it thinner than any plasma or LCD screen currently available. It's likely other major consumer electronics companies will jump aboard the OLED bandwagon, although if it's anything like early plasma pricing, you should start saving for it now.

Also see "On Display", page 90.

Monsieur Cresotte's OLED is wafer thin.



Optical drives

Storage comes in two flavours — online and offline. The terms have nothing to do with Internet or network storage, but refer to the availability of the storage medium to the controlling PC or server.

Online storage is currently active, and best identified as a hard disk drive installed in a PC. It's always available and online to the PC while it's running.

On the other hand, offline storage is purposeful, removable and unavailable to the PC until it's needed (and mostly has to be manually

prepared). CDs, DVDs, tapes and flash memory cards or drives come under this umbrella.

Though the price of hard disk drives has fallen dramatically, offline, optical-based storage (CD or DVD) is still cheaper — a good value hard disk comes in at around 86 cents per gigabyte, a single layer DVD holding 4.9GB costs around 27 cents per gigabyte. The time taken to burn a disc has so far stunted the growth in popularity of mass storage on DVD. However, home burning is becoming more economical as drives get faster.



SWEET SPOT DVD WRITER

ASUS DRW-1608P DVD writer — \$115

This 16x DVD±RW drive, with 6x Double Layer support and rewriting ±RW at 6x on 2.4x media, was recently added to APC's Best Buys (page 58) due to its high speed, ample features and reasonable price (its software bundle, which includes Nero 6 OEM and Ulead's DVD Movie Factory SE, is worth \$115 alone). The ASUS is also fast, burning a full 8.5GB Double Layer disc in under 19 minutes and a 16x DVD+R in one minute and 40 seconds. DVD-R Double Layer support is firmware upgradeable.

Optical drives are very delicate, so keep the receipt. Options on DVD writers are abundant, though most people won't use half of them due to their very specific nature. If the drive is mainly used for burning data to disc, choosing speed and reliability over DAO jitter reduction will provide you with a quality component without the price premium.

Newer DVD writers require a constant stream of data to write at faster speeds, which some older PCs might not be able to provide through UDMA/33 or slower IDE ports. If the IDE component of your motherboard is slower than UDMA/33, consider adding a PCI IDE controller card.



DREAM DVD WRITER

BenQ BW1000 Double Layer Blu-ray drive — \$184

There's a technology slowly moving off drawing boards that will make DVD capacity look as meagre as the CD — Blu-ray. BenQ demonstrated its first production model Blu-ray writer in June at Computex 2005. The company's first foray into the high density format, the BW1000 writes up to 25GB in single layer mode in roughly 30 minutes, or 50GB in Double Layer. That's per disc! In the same way that DVD burners write to CD, BenQ's Blu-ray drive will write to DVD at near current speeds.

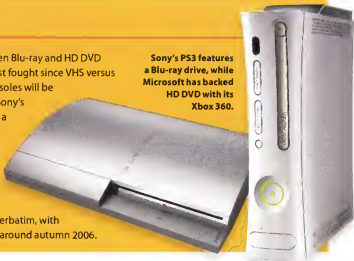
TECHNOLOGY ON THE HORIZON

As with CD before it, DVD speeds have roughly doubled every six months. The first DVD burners wrote a disc at 1x, or around 60 minutes for a complete disc. Current 16x burners can fill a single layer DVD in approximately five minutes at a storage rate of around 20MB per second, on par with current hard disk drives. The main reason optical drives haven't totally replaced hard disks is the seek latency — the time it takes the drive to find a piece of data and spin the disc to speed before shooting it down the bus back to the PC.

The battle for the next generation of desktop optical drives and high definition video

distribution — between Blu-ray and HD DVD — could be the hardest fought since VHS versus Betamax. Gaming consoles will be in the front line, with Sony's PlayStation 3 sporting a Blu-ray drive and Microsoft's Xbox 360 set to have an HD DVD drive. HD DVD media production has been developed between Maxell and Verbatim, with the first products due around autumn 2006.

Sony's PS3 features a Blu-ray drive, while Microsoft has backed HD DVD with its Xbox 360.



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Networking

Both wired and wireless LANs are faster than ever, with Gigabit Ethernet and 802.11g interfaces increasingly becoming standard. So it makes sense to buy a router which supports these technologies, especially with combined router/switches and router/access points. That said, don't buy a gigabit router if all you need is a gigabit switch to augment an existing router.

If it's been some time since you last bought a router, you may be surprised by the features available in affordable models, including real

firewalls and VPN gateways. Don't overlook the form factor — think about how you'll arrange it with your other kit. Staying with your current vendor might mean you can neatly stack a new router with an existing ADSL modem and print server, but a new all-in-one unit will reduce clutter.

Finally, if you don't have access to a dedicated IT support staff, you're advised to choose a model specifically designed for Australian users, or at least localised for easy setup with Australian broadband providers.

SWEET SPOT GIGABIT ROUTER

D-Link DGL-4300 — \$300

Choosing the best gigabit router is difficult, since buyers have different priorities. That said, a device such as D-Link's DGL-4300 Gaming Router will suit most people's needs. It combines a four-port 10/100/1000 switch, a 108M (nominal) wireless access point, and a 10/100 WAN port. (If you don't want wireless, there's the DGL-4100.)

What sets it apart from run-of-the-mill SOHO routers is the ability to prioritise time-critical traffic such as games and VoIP. You don't want to get frugged just because your housemate has started fetching a bunch of Podcasts, or a VoIP phone conversation with an important client to break up



because you're downloading the latest release of your Linux distro. It also has the usual firewall and access control features.

While the DGL-4300 supports VPN passthrough, you might prefer something with stronger VPN capabilities, such as Netgear's ProSafe VPN Firewall 25. This SNMP-manageable device also features four 10/100/1000 Ethernet ports but no wireless capability. However, it does offer hardware encryption support for up to 25 simultaneous VPN tunnels, plus optional virus and spam filtering powered by Trend Micro.

MIMO

MIMO — multiple input/multiple output — is a hot topic in wireless networking. It works by using two or more antennas to transmit signals, which are recombined by the receiver. A simple approach is to use two separate channels (channel bonding), but that's antisocial if there are adjacent WLANs. The alternative is a diversity system where multiple signals are transmitted in the same channel, each through a separate antenna. Radio waves follow different paths due to reflections, so the receiver's multiple antennas can between them pick up each signal.

MIMO will be standardised by 802.11n, but not until late 2006 or early 2007. The aim of 802.11n is an actual throughput of at least 100Mbit/s and greater range than 802.11b/g. As is often the case, there's a trade-off between speed and range.

Players are split into two main camps, WWiE and TGN Sync, but neither gained enough support for their proposals to proceed. At the time of writing, efforts were under way to merge the proposals in a form acceptable to both groups.

Don't assume existing MIMO products with labels such as "Pre-N" will eventually be upgradeable to 802.11n. They're more like an interim measure.

Whatever speed is available, people always want to go faster. The WIGWAM (Wireless Gigabit With Advanced Multimedia Support) project, sponsored by the German government, aims to have a working 1Gbit/s specification ready by 2007, in time for consideration as an 802.11 standard.

TECHNOLOGY ON THE HORIZON

Ten gigabit per second routers which can transmit the entire contents of a DVD in four seconds already exist, but they're aimed at carriers and service providers. However, fast links are increasingly available to ordinary users and will take gigabit routers mainstream. Uecomm, an Optus subsidiary, offers VLAN fibre connections at up to 8Gbit/s. These present as an Ethernet port, so you need a router that can cope. You don't want to pay for that bandwidth and then have it choked by a slow router.

While the price currently rules out anyone other than heavy business users, sooner or later fibre to the home will become a reality. In Tokyo and South Korea, home connections running at 10, 20 or even 50Mbit/s are commonplace.

You might think 10Gbit/s would give you bandwidth to spare, but since video, voice, data and more will be running down the one pipe, Quality of Service (QoS) support is crucial. Uptake of 10Gbit/s Ethernet equipment will lead to lower prices, as was seen with 100Mbit and more recently gigabit devices. Work is already under way on

40Gbit/s Ethernet, and 100Gbit/s is on the cards.

The Ethernet WAN market is predicted to grow as the technology offers high bandwidth at relatively low cost. It also provides a QoS mechanism and allows flexibility in that the bandwidth available can be simply "dialled in" by the provider, subject to the limitations of the kit installed at each end of the fibre.

At present, Uecomm provides such services by bonding up to eight 1Gbit/s links. Customers requiring greater point-to-point bandwidth are better served by dense wavelength division multiplexing (DWDM) links, which carry up to 40 10Gbit/s connections over a single optical pair, each carried by light of a different wavelength.

According to Brendan Park, director of strategy at Uecomm, future economies will come from the use of reconfigurable add/drop multiplexers (ROADMs), which allow network operators to optically "switch on" extra wavelengths. This is cheaper than relying on electronic switching of signals carried optically. He also notes a trend away from routing towards switching.

ASUS recommends Microsoft®Windows®XP Professional



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Gaming

One of the most unforgiving tasks for current PCs is gaming. Modern games can stress every part of even the most cutting edge systems, and when your PC slips below minimum spec, it's painfully noticeable.

A gaming-focused upgrade can involve extensive renovation, but modifying just two key elements will produce a significant improvement. The first is more RAM — 512MB is ample, but 1GB is ideal.

However, the biggest single gaming upgrade is the graphics card. The latest graphics cards are faster and pack more memory than their older

counterparts. There have also been significant leaps in architecture over the past few years, translating to tangible performance boosts.

Cards from the GeForce2, GeForce4 MX and original Radeon family support DirectX 7, essentially a hardware version of OpenGL. GeForce3, GeForce4 Ti and Radeon 8500 support DirectX 8, a basic programmable shader specification. Radeon 9700, X600, X700 and X800 and GeForce FX support DirectX 9 Shader Model 2.0. Finally, the GeForce 6 series and GeForce 7800 GTX support the top DirectX spec, Shader Model 3.0.

SWEET SPOT VIDEO CARD

BFG GeForce 6600GT OC video card — \$299

There are three distinct tiers of graphics cards: high-end, mainstream and budget. The high-end cards are designed for hard-core gamers who want the best possible resolution, all the effects turned up, and anti-aliasing and anisotropic filtering gently caressing their eyeballs. Budget cards are mainly for normal desktop use and only include DirectX 9 support to make them Longhorn-compliant.

Mainstream cards hold the sweet spot in the market and APC recommends the GeForce 6600GT. It performs at a comparable level to ATI's similarly positioned X700XT but features the more advanced Shader Model 3.0. It's also available in both PCI Express and AGP, with no noticeable performance gap between the two (the only difference is that the PCIe model supports SLI dual graphics card technology).

A slightly more extravagant product is ATI's X800XL. At a touch over \$500, this is a cut-down version of ATI's high-end cards. It lacks Shader Model 3.0, but the extra \$200 buys significant raw performance boosts.



DREAM VIDEO CARD

Two NVIDIA GeForce 7800 GTX cards side by side in SLI motherboard — US\$599 each

Last year, NVIDIA lifted the lid on its SLI dual graphics card technology and it quickly became the runaway hit of the component industry. Now ATI has jumped on the bandwagon with its dual graphics card technology, called Crossfire. Both technologies are PCI Express only.

NVIDIA's version is somewhat restricted: it can only be used on nForce 4 SLI chipsets, and with a maximum of two cards of the same model.

However, NVIDIA has recently opened this up to allow mixing of manufacturers. ATI's option lets different models of card interact but requires you to buy a new "master" card to control the setup. You do need to use an ATI chipset, however. Both companies only offer support on some models of card.

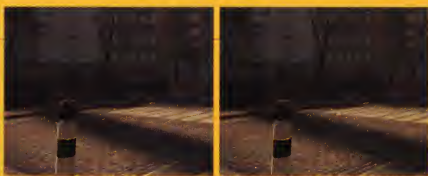
For jaw-dropping performance, nothing beats running two NVIDIA GeForce 7800 GTX cards side by side in an SLI motherboard. It's costly, but equates to 48 pipelines of Shader Model 3.0 graphics power. Just be prepared to upgrade your power supply too.

TECHNOLOGY ON THE HORIZON

New graphics cards will improve your experience in two areas. The first is frame rate. Faster cards can render onscreen images much quicker, which translates into a smoother, infinitely less frustrating, gaming experience. While this will be the most tangible benefit from your upgrade, you will probably be able to turn up your image quality as well, allowing for greater detailed scenery and characters in-game.

Both NVIDIA and ATI are tight-lipped about future products, but the recent unveiling of Xbox 360 has shown a likely candidate for the next major generational shift in PC graphics.

ATI's "Xenos" graphics processor, developed for the Xbox 360, is based on its shelved R400 graphics card. Considered too radically different to modern 3D graphics



A scene from *Half-Life 2*. The image on the left is taken with all the graphics settings on low, while the one on the right has everything maximised. While the overall scene is similar, the maximised image has much greater detail and more accurate lighting and shadows. This is the kind of difference you can expect between the low-end and high-end graphics cards on the market.

architectures, the R400 does away with separate pixel and vertex shaders. Instead packing 48 general purpose pipelines. This is load-balanced to allow developers to squeeze maximum power from the processor

without worrying too much about the physical intricacies of the pipeline. If the R400 is ever resurrected for the PC, expect it to emerge around the same time as the mythical Longhorn OS from Microsoft.

Media centre

While Microsoft continues to talk up the media centre experience, all of the hardware components are available separately. There are even third-party software packages which replicate the user interface. Most PCs will be more than capable of running standard definition video content; however, for high definition video either a fast CPU or graphics card with dedicated hardware acceleration is needed.

All media PCs will benefit from more RAM and storage capacity. If you're serious about protecting your media, a RAID array with

redundancy is the best storage solution. To extend the functionality of your PC however, APC recommends installing a TV tuner card. Analog tuner cards generally work fine in any location. Digital cards require you to reside in a digital TV broadcast area and also depend on drivers and application software to pick up Australian DVB-T broadcasts.

SWEET SPOT TV TUNER CARD

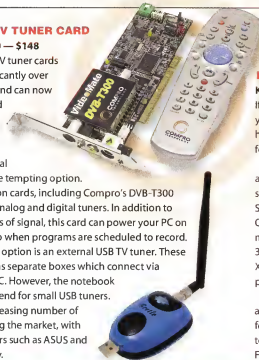
Compro DVB-T300 — \$148

The cost of digital TV tuner cards has dropped significantly over the past few years and can now be found for around the same price as analog models.

Delivering a much better picture, digital is certainly the more tempting option.

Hybrid PCI expansion cards, including Compro's DVB-T300 card, feature both analog and digital tuners. In addition to receiving both kinds of signal, this card can power your PC on and off according to when programs are scheduled to record.

The other major option is an external USB TV tuner. These traditionally come as separate boxes which connect via USB cable to your PC. However, the notebook boom is driving a trend for small USB tuners. There's an ever-increasing number of these devices hitting the market, with motherboard makers such as ASUS and MSI leading the way.



DREAM Upgrade

KISS DP-558 — \$1,499

If you're serious about a media box, why not rebuild your PC from the ground up? Several manufacturers have launched home theatre PC designs, most of which take innovations from small form factor and notebook PCs and style them like sleek hi-fi components.

Another option is to relegate your PC to file server status and get a dedicated player to connect to your home network and pull files off shared network directories. There are many such players on the market. Some, like the KISS DP-500, combine this function with DVD playback. Others, such as the Zenonic Z400, are purely focused on playing back media stored on a home network. Even Microsoft's forthcoming Xbox 360 console is designed to play media over the network from Windows XP Media Center Edition PCs, although, unlike some third-party media players, it probably won't support formats such as DivX and XviD.

The dream product in this category is the KISS DP-558, which has an amazingly extensive feature set, combining support for a range of video formats, Ethernet connectivity, DVD playback and hard drive recording of television shows. You can even access the DP-558 over your network via FTP to manage the data stored on the hard disk.



TECHNOLOGY ON THE HORIZON

While Microsoft is expected to release a minor update to MCE later this year, real changes won't arrive until Longhorn in 2006. The rumour is that MCE will then be incorporated into the standard Windows OS.

On the hardware front, makers of the silicon tuner chips used in both TV tuner cards and consumer electronics devices have already demonstrated silicon capable of receiving multiple 1080i HDTV streams at once. Several factors make the use of such tuners capable of receiving two or even four HDTV streams simultaneously: the increased

processing power in PCs, in the form of dual core CPUs; widespread support for HD video acceleration in current generation graphics cards; and the bandwidth offered by PCI Express.

Such a card could allow you to record three HDTV programs while watching another, as well as facilitate picture-in-picture and other advanced functions. The two most serious bottlenecks will be the decoding hardware and storage capacity, as even a single uncompressed 1080i HD stream gobbles up 1.485GB/s of bandwidth.

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Digital video

Unedited home video is a crime against friends and family. FireWire or USB can often give you the input and output you need for editing video from a digital source. A specialist video capture and editing card adds grunt to the encoding and decoding operations, which can take the most work. You will need some additional hardware to convert analog source material — VHS, Video8 and Hi8 — to digital video.

Both internal and external solutions are available. The key is fast throughput here to ensure error free video transfers. Neither internal nor

external is better — each can perform good quality digital-to-analog conversion. The critical test is in the encoder chip itself.

Bidirectional conversion is a good feature if you need to output your footage in analog. However, since the most important use is converting analog to digital formats for DVD or DV output, it isn't a must-have.

Many TV tuners also boast video capture, but these compress the source as it arrives. To get top-quality results, the source material should have as little compression as possible.



SWEET SPOT VIDEO CONVERTER

Canopus ADVC55 — \$399

For a good portable analog video converter, the Canopus ADVC55 is a nice external device. It accepts S-Video and composite inputs and connects to your system via FireWire. The Canopus DV codec is highly regarded, so you'll get great picture quality from converted material.

At \$599, the Canopus ADVC100 adds bidirectional support for the return DV-to-analog footage. When capturing long analog sequences, some devices can lose sync between video and audio. The ADVC100 locks the two together perfectly.

For an internal solution, the Pinnacle Studio AV/DV Deluxe Version 9 (\$414) offers a good hardware and software package to get you working quickly. The card features bidirectional encoding, including a break-out box for easy connector access, plus video cleaning to bring out the best in analog footage.

DREAM CAPTURE CARD

Blackmagic DeckLink HD Pro — \$3,230

Although the HD revolution is only just beginning, any editor can capture uncompressed HD video with the Blackmagic DeckLink HD Pro 4:4:4 capture card. All HD formats are supported, from 720p to 1080i and even the stratospheric cinema projection quality of 1080p. Both PAL and NTSC standard definition formats are supported.

The card is designed to use with professional software. Adobe Premiere Pro is the most applicable solution for PC, as it works directly with full 4:4:4 high definition footage. Considering this is the capture card of choice in Hollywood editing suites, the DeckLink HD Pro 4:4:4 is a bargain at \$3,230. Even better, Blackmagic is an Australian company.

With 10-bit 4:4:4 uncompressed video, you're going to need serious disk space. At this data rate we're talking about 180MB per second of throughput and more than 10GB per minute of storage requirement. A fast terabyte or two of storage should do the trick in your dream machine.



High definition accelerators

With greater demand being placed on PCs by high definition video decoding and playback, graphics cards are being called on to take some of the load off the CPU to keep things running smoothly. Particularly when you're looking to run concurrent tasks — a must for any media centre PC — some hardware assistance will really help.

Whether you want an HD home theatre system or just want to be sure you can handle it, you need to choose a graphics card that offers this kind of support. NVIDIA's high definition video processor (HDPV) technology is now built into its entire GPU range (see our review of the GeForce 7800 GTX on page 42).

Also, watch out for ATI's Video Immersion engine, found in such cards as the Radeon 7200, 8500 and the All-in-Wonder range. Many more ATI cards will have this feature in future — just double-check the specs.

ATI's All-in-Wonder X800 card.



TECHNOLOGY ON THE HORIZON

The thrilling ride toward high definition is picking up speed, with more and more home theatre projectors, plasmas, LCDs and TVs moving toward HD support. Built-in tuners are still uncommon, but the set-top box market is quickly integrating HD into PVR and home theatre decoders.

Although 1080i gets the most attention as the resolution on everyone's wish list, 720p is arguably a superior format, with progressive scan offering a cleaner and smoother viewing experience. So why the lust for the big numbers? That's probably down to the number itself — everyone loves big numbers.

The best argument for 1080i is its relationship to

the smoothest, sharpest, best-looking HD resolution currently in existence — 1080p. With screens built for 1080, the lines are there for a shift to progressive scan in the future. A screen resolution of 1,920 x 1,080 may not compare with your 5 megapixel still camera, but if you've seen a digital session of *Star Wars* you'll know how good it can look.

What next? Some suggest that the next step is IMAX-class resolution of around 4,096 x 2,048 pixels. That's a lot of pixels. Which means a lot of storage will be required if you're thinking about editing anything at that size. Don't expect this technology before the end of the decade.



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Hard drives

Upgrading a hard drive has advantages beyond merely hoarding more bits and bytes. Changing from a 5,400 to 7,200rpm hard disk can make a huge difference in application load time, responsiveness under heavy load and the way graphics and video editing applications respond and render. Likewise, moving from a 7,200rpm to a 10,000rpm drive also makes big a difference.

Hard disk drives for PC desktops come in two main varieties — Parallel ATA (PATA, also incorrectly known as IDE) and Serial ATA (SATA). Older

motherboards will be limited to using the parallel interface, while most socket 478 for Pentium 4 and socket 940 or 939 Athlons have Serial and Parallel ATA connectors. See the cheat sheet (page 88) for the difference.

Provided there's room in your case, adding an extra hard drive is straightforward. Plugging it in to an available PATA or SATA connector (not in line with your optical drives) and formatting once in the operating system is all that's involved. Replacing your primary hard disk drive and reinstalling the OS speeds up your Windows experience, but takes longer.

SWEET SPOT HARD DRIVE

**Western Digital
2000JB (Caviar
SE) 200GB 7,200rpm
PATA hard disk with
8MB cache — \$145**

Although small drives are increasingly inexpensive, a 40GB hard disk is not the wisest choice when upgrading. The three main manufacturers for commodity PC drives (Seagate, Western Digital and Maxtor) offer quality product within a similar price range, so choosing a component based on its price tag should not come back to bite you. As long as it plugs into the motherboard (either PATA or SATA), any PC system running Windows 2000 or Windows XP will be able to address even massive disks.

Western Digital's 2000JB, a 200GB model, is the sweet spot unit in this category. The drive's 8MB cache will speed up burst transfers and data LifeGuard tools (available from the Western Digital Web site, www.westerndigital.com) keep tabs on the drive's health as it ages. It's available in PATA, SATA and SATA II configurations.



DREAM HARD DRIVE

**Western Digital Raptor
74GB 10,000rpm SATA hard
disk with 8MB cache — \$289**

A PC is only as fast as its slowest component. Despite all the talk of memory bottlenecks, CPU frontside bus tweaking and overclocking, the hard disk drive will still slow you down every time a piece of data needs to be stored or read from permanent storage. Cashed-up geeks have been using enterprise-level SCSI drives for years; now Western Digital has produced one which is perfect for the enthusiast.

The company's Raptor series of 10,000rpm hard disks have a SATA interface only. Native Command Queuing (NCQ) optimises the path the read head travels over the platters for extra oomph. If you're struggling with large digital media files or long load times, the faster spindle speed and 4.5ms seek time will really make a difference. The only trade-off with Raptor drives is their limited 36GB or 74GB configurations. Mirroring SCSI drive capacity, Raptors are more often seen set up as a system or digital video scratchpad, while larger, slower disks take care of archiving.



TECHNOLOGY ON THE HORIZON

SAMSUNG NAND SOLID STATE DISK

Mechanical hard disks are prone to breakdown through deep bearings, dropped heads, acceleration and deceleration, shock and moisture; all disastrous for a device storing important data. Beyond the mechanical disk drive is the solid state drive. No moving parts, no wear, less heat and less power consumption. And a whole lot more expensive.

Solid state drives (SSDs) have been available for some time, albeit in niche applications. A common type was hard drive replacement hardware stacked with common RAM. Samsung recently announced a new 16GB NAND flash storage drive with 8Gbit/s transfer capabilities, though making it fast enough to take on a major storage role in a desktop, server or notebook has proved more difficult.



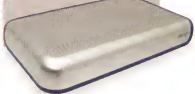
Solid state technology, such as this NAND drive from Samsung, will make PCs faster and quieter.

Though 16GB isn't a patch on the half-terabyte behemoths starting to see the light of day, it's plenty for an operating system installation and virtual memory paging file. Running 50% faster than traditional drives, with no noise or thermal impact, SSDs mean truly fast and quiet PCs are ever closer.

Additional drive options

Options for adding more hard disk storage to an already loaded machine are plentiful. PCI and PCI Express-based adaptors can add from two to 16 drives in serial or Parallel ATA, or even SCSI for the more adventurous. Often cards advertised as RAID controllers support drives without putting them into an array, so picking up a budget RAID controller may provide more speed increases in future.

In some cases, buying an external USB or FireWire hard drive can be just as effective, and more portable. Watch out for higher prices.



Notebooks

Some notebook makers, including Dell and IBM, have made a selling point of upgradeability, with "bays" to add or remove hard drives, batteries and optical drives. Even notebooks without easily accessible upgrade bays are generally upgradeable. Third-party upgrade kits are available for many common notebook parts, including RAM, hard drives, optical drives, batteries, USB/FireWire ports and wireless networking. Some of these upgrades, notably hard drives and optical drives, require disassembly, which can be risky given the carefully constructed innards.

Although they don't promote it, most major vendors also provide upgrades through their repair centres. They usually recommend you buy approved parts, which can be more expensive. The argument is valid: heat management is one of the most critical aspects of notebook design, and using a part that outputs more heat than originally allowed for can affect system stability or damage other components. But there's nothing stopping you getting the model number of the approved part from your notebook maker (or its Web site) and buying it online.



NOTEBOOK UPGRADE SWEET SPOTS

1. RAM: usually the easiest part of a notebook to upgrade and can substantially boost performance. Generally, RAM slots are accessed via a panel on the underside of the notebook. Notebooks usually only have two slots, and require small form factor "SO" RAM. Use the CPU-Z freeware utility on this month's cover DVD to find out how many sticks are already installed and determine the best size to buy. **\$12MB PC2700 SODIMM notebook RAM — \$91.10.**

2. Hard drive: most notebooks use 2.5in hard drives, though the latest ultra-portables use 1.8in PCMCIA drives. However, some can only accommodate 9.5mm deep drives, while others can take 12.5mm units. Check with your manufacturer. Many come with 4,200rpm drives, but 5,400rpm and 7,200rpm versions are now available. **Seagate Momentus 5400.2 100GB — \$315.**

3. Optical drive: ask the manufacturer whether an official upgrade is available. If not, you may be able to find third-party upgrades. Alternatively, use an external slimline optical drive connected via USB 2.0, PCMCIA or the vendor's proprietary connector. **LaCie Slim External Double Layer 8x DVD writer — \$295.**

4. Ports: if you have a PCMCIA slot, you can get cards which add USB 2.0 and FireWire ports. **Double H 4-port USB 2.0 PCMCIA Card — \$23.09.**

5. Networking: many older notebooks don't come with wireless networking. However, most have a PCMCIA slot which can take Ethernet or Wi-Fi cards. If your notebook only has a USB port, try a USB Ethernet or Wi-Fi dongle, or plug in a USB modem. **Billion USB 802.11g wireless networking adaptor — \$42.90.**

Risky business

Technicians at Toshiba, Dell and HP explain what can go wrong with DIY notebook upgrades.

- Unless torque screws with "locktight" compound are replaced using the correct torque wrench and compound, major damage can occur. (Toshiba)
- If screws are not removed in the right order, breakage can occur when the user attempts to open the chassis. (Dell)
- Fine metallic circuits on the motherboard can be damaged by screwdriver contact. (Dell)
- Locking clips for hard drives, optical drives and memory cards may be broken. (Toshiba)
- Keyboards and case trim may be broken by attempting to remove the keyboard to get access to components. (Toshiba)
- Thermal integrity (the notebook's ability to dissipate heat effectively) may not be maintained if a notebook is not reassembled properly. (HP)

Do it yourself — is it worth it?

Taking the Black & Decker to your notebook may allow you to upgrade your hard drive, but common sense dictates you might be "downgrading" your warranty in the process. APC asked three major notebook makers what their official stance was, and they were surprisingly supportive of DIY upgrades.

Dell's corporate affairs manager Paul McKeon said: "Dell encourages and empowers customers to fully familiarise themselves with our products, which is why we have detailed information about our platforms on our Web site and many of our products are designed to be user serviceable. Dell's warranty does allow customers to upgrade their notebooks under warranty, but we recommend Dell certified parts. We also provide parts for

HDD upgrades (drive and cradle not just cradle)."

Both HP and Toshiba said RAM upgrades and swappable "bay" devices were okay for users to install, but beyond that it users should contact an authorised service centre.

So would users actually forfeit their warranty if they opened up their notebooks to do their own upgrades?

Once again, Dell was the most flexible here. McKeon said: "No. In fact, many of our customers prefer if we just send the part and to allow them to change it themselves. However, only Dell parts are covered under warranty."

An HP spokesperson said: "It is important to note that all notebooks are designed differently, so we recommend you contact HP before performing any upgrades if you are unsure."

Toshiba's Caroline Hendra said: "[The] warranty will remain valid if a customer installs memory, however if they have opened the chassis and it is obvious this has been done and caused damage, the warranty is voided."

And the cost of using their service centres? Dell and Toshiba were unable to respond to APC's enquiry by press time, HP said labour costs for upgrades and service are charged at an hourly rate at its service centre. "Customers can request a quote for any job, the cost of this quote would be deducted from the labour costs if the customer goes ahead with the work. HP's general hourly rate is \$132 plus the cost of components if not supplied by the customer. It may cost more for onsite, same day response or next business day service."

Cheat sheet

SOCKETS

The most notorious breaker of an upgrade path is the change of CPU socket. The Pentium 4 is on its third generation of socket, the Athlon 64 is on its second, and AMD is now phasing out the Socket A design used for the Athlon and Athlon XP CPUs.



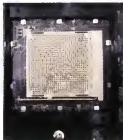
Socket 478:
This 478-pin socket debuted with Intel's Northwood core Pentium 4 and has now been superseded.



LGA 775:
Intel now uses a "pinless" CPU design for its processor range and has shifted the pins to the motherboard socket.



Socket 754:
AMD debuted the Athlon 64 with a 754-pin socket, which is a design not supported by all Sempron CPUs.



Socket 939:
The mainstream Athlon 64, Athlon 64 X2 and Athlon 64-FX CPUs now all use this 939-pin socket design.



POWER

The x16 PCIe slots supply a lot more power to graphics cards than AGP did. To accommodate this, PCIe motherboards require a power supply with a 24-pin ATX power plug rather than the traditional 20-pin ones. Most new power supplies come with plugs that can be easily adapted to 20- or 24-pin configurations.



While they look similar, 20- and 24-pin ATX power connectors are keyed in a way to prevent disastrous errors when plugging them in. Some motherboards can use a 20-pin PSU and a 4-pin Molex connector for those who don't have a 24-pin PSU.



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MEMORY

Modern PCs generally use one of two main types of memory. DDR is the memory type of choice for Athlon 64- and Sempron-based systems, while DDR2 is used in recent Intel chipsets for the Pentium 4 and Celeron.

DDR memory uses 184 pins, while DDR2 has 240 pins. Both types have a single notch in different places on the DIMM to prevent the insertion of the wrong kind of RAM into a motherboard slot.

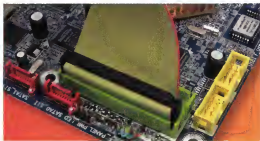
EXPANSION

PCI Express was designed to be scalable and hence replace both AGP and PCI expansion slots on the motherboard. Most recent chipsets have abandoned support for AGP in favour of the new x16 PCIe connector for graphics cards, although they still support PCI slots alongside x1 PCIe slots for other expansion cards.

PCIe comes in two formats on current motherboards — the larger x16 graphics connector and the smaller x1 expansion card connector.

**STORAGE**

Serial ATA (SATA) is slowly replacing the unwieldy ribbon cables of Parallel ATA (PATA). The good news is that motherboards still come with support for PATA drives. Adaptors to connect PATA drives to SATA ports on the motherboard exist, but are surprisingly hard to find.



The major benefit of SATA is the thinner cable, which prevents clutter inside a PC case and helps with airflow.

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of a desktop PC, are on the way out. Instead of being tied to a display and specific input devices, people want displays that form part of the environment so that a glance or a gesture reveals the data they desire.

BIGGER IS THE FIRST STEP

Display technologies that blur the lines between TV and computing aren't yet available, and won't be until new interface capabilities free users from reliance on keyboards, mice and other input devices.

The first steps towards the new world of immersive information and ubiquitous screens involve new display technologies that deliver bigger screens, because only by making screens larger can they become a part of the environment instead of a focal point for occasional use.

Cathode Ray Tube (CRT) displays don't figure in this future. The second oldest display technology has consistently failed to overcome problems of bulk, weight, heat emission and screen size.

Plasma screens are another dead end. Electronics manufacturers are surprised that plasma sales still exceed LCD sales in Australia (a situation repeated hardly anywhere else in the world) given the technology's problems with gradually diminishing brightness and "burning in" (images etching themselves into screens after persistent use).

There's some hope for front projection as a way to get bigger screens into more rooms, more often. Projection technologies are advancing rapidly and prices are tumbling. BenQ, for instance, promises to have a Mini DV camcorder-sized projector on sale for less than \$800 this Christmas.

The problem for projectors, however, is that machines designed for data are expected to work in environments with relatively bright light. Home theatre projectors, on the other hand, are designed to work in the dark, to recreate the cinema experience as closely as possible and show movies at their best.

Few users want machines to do both, so few companies make them. Only as demand for converged devices rises will manufacturers start to churn out projectors which combine the very different technologies that go into making each type of projector perform.

Will bigger, brighter, lighter displays change the way computers are used or simply mean more eyestrain? Simon Sharwood gazes into the future.

To grasp the future of the computer display, consider the history of the toilet, a device until recently connected to a single, immovable network access point in an inconvenient backyard location.

Today's loos occupy far more comfortable and convenient positions in the centre of the home, a shift from outhouse to mid-house driven by a desire for comfort and enabled by easy replication of network access points.

TVs are repeating the process, also for reasons of convenience and comfort. Again, easy access to network connections makes it possible to have more displays in more places.

"Once built like a sidebar, squatting immovably at the centre of the home, the TV set has slimmed down and limbered up — it's

ready to go," says Professor John Hartley, dean of the Queensland University of Technology's Creative Industries Faculty. "The family TV is migrating out of the lounge room. It is following family trends — multitasking, used by different family members at different times and ready for work as well as leisure."

Computer monitors too are following the trend. The twin booms in laptops and home wireless shows users simply don't want to be stuck at a desk to compute. Instead, they want information to come to them. The natural evolution of this trend is for displays to become multipurpose machines which can present DVDs as well as data as required.

Old modes of data consumption, such as sitting on the couch or huddling in front

The evolution of the telly

1885-1907

ELECTROMECHANICAL TELEVISION

German inventor Paul Gottlieb Nipkow is credited with inventing the first television, a device involving a pair of rotating discs, one with a spiral of holes drilled into it, a light source and a selenium cell.

1907-1931

ELECTRONIC TELEVISION

In 1907, Russian scientist Boris Rosing used a mirror drum scanner akin to Nipkow's mechanical television to capture images, then displayed them through a CRT. Not commercially viable, however, until 1931.

1940-1953

COLOUR TELEVISION

Some of the earliest TV designs envisioned colour displays, but building them was hard. Eventually CRTs were revamped to include three electron guns — one each for red, blue and green — in a single tube.

UP THE REAR?

Rear projection is a technology that may have a role to play. For most people, rear projection evokes memories of the horribly clunky sets installed in pubs and clubs bringing dim and blurry images of major sporting events to life.

Manufacturers realised no-one wants that kind of bulk and reinvented the technology by taking a small LCD panel and shining a light through it to project the image on the screen.

Samsung and Sony already have 60 and 61in LCD rear projection televisions on sale in Australia. APC spent a few minutes in front of Sony's Grand WEGA display (\$7,499) and can vouch for its lovely picture quality, but while it's much slimmer than a regular rear projection or large CRT, there's no chance it will hang on a wall.

Standard LCD screens offer a better chance of meeting future needs, especially as "eighth generation" manufacturing techniques come into production this year.

The key advance of this new generation is the ability to create larger sheets of LCDs, with panels up to 130in. While it will be possible to create a single display of this size, the more important advance is that a larger number of smaller screens can be cut from a sheet than was the case with the 187 x 220cm sheets produced by seventh-generation factories.

"We'll be able to cut eight 40in screens from an eighth-generation panel with only 9% material loss," explains Ian Lowe, Sony's Group Marketing Manager for consumer AV-IT Technology. This efficiency will push down the cost of LCDs and, by making them cheaper than plasma screens of similar size for the first time, drive a nail into the plasma coffin.

PRINT THE TELLY

LCD does have problems, though. Poke an LCD panel and the marbling effect demonstrates its fragility. The technique for building even eighth-generation panels relies on a process that sees the liquid crystals injected between substrates which have already had electrodes, colour filters and polarising filters applied.

The complexity of that manufacturing process adds cost, while the need for two substrates adds weight. And the bigger the screen, the stronger it needs to be to handle the weight. So while a 130in LCD is

The big screen and beyond

Big, bold displays have long been a staple of film, television and literature. Did you tune in to the industry's vision, or change channels?



Source	Screen technology	Plausibility
1984, written by George Orwell	In the first series of <i>Big Brother</i> , everyone in the country is a housemate. "Viewcreens" adorn every room of every house, office and building, pumping out the program around the clock. Viewcreens have built-in cameras so <i>Big Brother</i> can watch you any time he chooses.	Technically do-able, as proved by the ability of extensive CCTV installations and jumbo screens in places like sports stadia to pick anyone out of a crowd and put them on display, or retrieve images for later analysis. Happily, dictators who like to wield this kind of control tend to find secret police more effective than big IT rollouts.
<i>Brave</i> , directed by Terry Gilliam	Terry Gilliam's vision of dystopia features lots of small black and white CRT screens enhanced by rectangular magnifying lenses.	This idea has become something of a dead end.
<i>Minority Report</i> , written by Philip K Dick, directed by Steven Spielberg	A curved bank of transparent screens fills an entire room. Tom Cruise interacts with the screens courtesy of a data globe that lets him manipulate windows using gestures.	The striking interface has been rebuilt in various labs using off-the-shelf commercial equipment and more dollars than is practical to make this mainstream for a good while yet.
<i>Neuromancer</i> trilogy, written by William Gibson	Heads up displays pump data into the eyes, accompanied by a direct connection to the brain.	Heads up displays are very real and have useful applications in both the military and industry delivering "augmented reality" (see APC January, page B9). Direct neural connections, however, are still some way off.

theoretically possible, it'd need to be bulked out to stop it collapsing under its own weight.

Manufacturers have already found ways around this problem. Panels are "painted" onto plastic in a process that resembles inkjet printing, resulting in flexible screens that can be bent to what Philips describes as "radii of curvature as small as 1cm."

Philips is also exploring rollable displays, imagining mobile phones and other portable devices with a thin film screen that extends to provide a larger screen than could be built into the device. The company has Sin models of the technology working today, but at a mere 240 x 320 pixels.

HE SED, SHE SED

Similar "painting" technologies are behind Surface-conduction Electron-emitter Displays (SEDs), appliances which use electron guns in the same way as CRTs. But where a CRT has a single gun that scans rapidly across the screen, SEDs use a new substrate with a tiny solid state electron gun for each pixel. The result is a thin, light, low-power display with picture quality to rival CRTs.

In May this year, Canon and Toshiba announced a joint venture to build a plant that will mass produce 40in flat panel displays by 2007. And even thinner screens are already available from a technology called Organic Light Emitting Diodes (OLEDs).

OLEDs work by placing a thin layer of organic materials between an anode and a cathode. Add electricity and the materials show off their electroluminescent properties by emitting light. These displays are very slim (OLEDs are generally described as being "thin films"), require tiny amounts of power, don't particularly mind being rolled or bent, and can deliver monochrome or full colour. Best of all, the manufacturing process is simple: it's possible to literally print OLED displays. ▶

1963

THE THIN AGE BEGINS

LCDs were first identified as a potential display in 1963 and plasma displays quickly followed in 1964. However, both took decades to burst out of the labs and into electronics shops.

1979-present

DAWN OF THE OLED

Kodak discovers polymers with light emitting properties in 1979, patents the idea in 1987 and debuts OLED-screened digital cameras in 1999. Dozens of companies are now working to make light, thin and flexible OLED screens.

► The technology has already found its way into digital cameras, mobile phones and an electric razor. The 20in prototype screens demonstrated in May 2005 were a clear declaration of this technology's candidacy for thin, light and ubiquitous displays.

WET SETS

OLEDs don't have the field to themselves. Philips is keen on Electrowetting, a technique that sees pixels made of tiny sealed cells containing a droplet of coloured ink and a reflective white background. When electricity is applied to the cell, the ink shifts to reveal the white background. By using three layers of cells with red, green and blue ink it becomes possible to create any colour if electricity is applied fast enough in the right intensities. This technology is very promising because it's easy to build, produces a bright image, allows frequent refresh to deliver picture quality and needs only low power.

Philips isn't putting all its eggs into the Electrowetting basket though, as it recently unveiled a combination of lenses and LCDs that bring 3D images to mobile phones.

And in May, Motorola demonstrated a Nano-emissive Display (NED), another new technology which uses carbon nanotubes to shoot light on to a screen. The technology is touted as offering screens 2.5cm thick, yet capable of delivering a 40in HDTV-capable display for under US\$400.

US company Actuality Systems can sell you a device called the Perspecta that resembles an upside-down goldfish bowl in which glowing 3D images are suspended. Walk around a Perspecta and you'll be able to view the images it contains from any angle. An interesting concept, but if you'd like one, you'll have to shell out US\$40,000.

SCREENS THAT SEE

Which display technology will achieve mass adoption from these contenders is anyone's guess. What seems certain, however, is that current displays, with their very limited connectivity and input options, won't retain the form they take today.

Instead, they'll include new interfaces for easier interaction, according to Professor Peter Eades, program leader of National ICT Australia's Interfaces, Machines and Graphic Environments (IMAGEN) research program. "The aim is to offer access to information from the architecture around us," he says.

This is where we head into unknown territory. Today's displays occupy the centre of

our attention, but a home or office full of large displays would occupy peripheral as well as normal fields of vision, and no-one yet knows what it would be possible or sensible to do in such an environment.

"We are mapping the abilities of human perception," Eades says. "We know Moore's Law does not apply to humans' ability to process increasing quantities of data."

IMAGEN's experiments therefore look for ways to help people process data without overloading the senses. One uses data gloves as a pointing device for images projected onto a screen, making a familiar interface more appropriate to the big screens of the near future. The unit has also built a sphere which, when coupled with a pair of projectors, becomes a map of the world. Roll the sphere over its sensors and continents and oceans shift as they would with a conventional globe.

The team has even built a pair of shoes in which the left shoe vibrates if the stock

market is going down and the right vibrates when it goes up. Intensity of vibration indicates the rate of ascent or descent.

These experiments are important because there's only so much a person can process visually. Other senses may therefore help increase data uptake and work alongside the coming wave of larger displays to deliver the immersive computing experience.

But finding those limits seems is a long way off. "A lot of the proposals we have are knocked back," Eades says. "I'm not a physician and don't realise how dangerous they are."

For the foreseeable future it seems that screens will grow larger and be seen in more places, but it will be some time before new ways to use them emerge.

At least the bathroom is closer when the time comes to relieve yourself, either using the waterworks or just to scream in frustration at technology's inability to deliver everything you want as soon as you want it. [ENTER](#)

What about digital paper?

Wouldn't it be good if paper could be replaced by electronic devices that display any information as well as record handwriting to make notebooks a thing of the past? That's the vision of digital paper, a long-imagined technology that is just starting to replace dead-tree paper.

Sony's Japan-only LIBRIé is one such device. Boasting a Memory Stick slot and special screen technology to deliver paper-like clarity on a monochrome LCD, LIBRIé is designed to replace books and magazines.

On the input side, a Swedish company called Anoto has developed digital pens that interpret the motion of your hand and turn it into digital documents. The pens can even pack Bluetooth to upload your scrawl into a mobile phone so you can send your thoughts wherever you like.

Of course, both devices are bulkier than a sheet of paper or a conventional pen. And LIBRIé lacks "real" paper's

ability to be rolled, folded, dropped and generally manhandled while still retaining the information it contains.

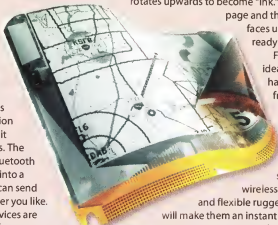
Dozens of researchers are working on this kind of true paper replacement, often using technologies that apply touch sensitivity to new, thin-screen technology such as OLEDs, or ultra-thin substances whose individual molecules have a black side and white side. Draw on these substances and the black side rotates upwards to become "ink." Wipe the

page and the white side faces upwards, ready for re-use.

Few of these ideas, however, have emerged from labs complete with the long-lived power supplies,

wireless networks and flexible ruggedness that will make them an instant alternative

to paper. The world's forests won't be safe for quite some time yet.



Digital paper: you can roll it, fold it and use it time and again. Well, that's the theory, anyway.



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ADSL2+ transfer mess

ISPs rolling out next-generation ADSL2+ services are facing difficulties transferring customers from Telstra's network. *Dan Warne reports.*

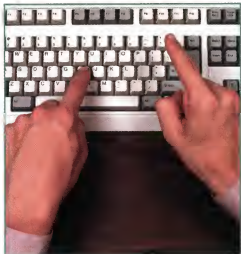
As previously reported (APC July, page 69), ISPs have been planning to get a leg up on Telstra's speed-crippled 1.5Mbit/s ADSL service by switching on full-speed ADSL2+ services at up to 24Mbit/s using their own hardware installed in Telstra exchanges. However, they are now discovering that getting Telstra Wholesale to move customers off its hardware is very difficult. Meanwhile, the telco is rolling out its own network upgrades to the ADSL2+ standard.

According to Simon Hackett of ADSL2+ ISP Internode, Telstra requires nearly three months' notice (84 days) to shift more than 10 customers at once from a Telstra DSLAM to an Internode DSLAM. And there's no managed process for shifting individual customers, who are required to disconnect from ADSL and then reconnect afresh.

Telstra spokesperson Liz Jurman told APC, "Essentially, the answer to all your questions is that we're working on it." The company hopes to have processes in place by early next year.

However, Hackett contends that Telstra has been promising for months that these problems will be fixed, and deadlines keep slipping.

"Not resourcing competition-sensitive issues sufficiently is a subtle and effective form of competitive advantage-retention for Telstra," he says. "This happens a lot. It means they can say in good faith [to] the regulator and the industry that they are 'working on it,' but with insufficient



Like it or not, Telstra says you'll just have to wait for your ADSL2+ transfer.

resourcing, it [naturally] can take forever to actually do it. And the longer it takes, the greater the number of customers who are retained on Telstra infrastructure in the meantime."

Australia's third largest ISP, iiNet (which recently acquired OzEmail) now has 34,260 customers on its own DSLAMs despite Telstra delays. However iiNet does not yet offer ADSL2+.

Netcomm ADSL2+ screw up

Netcomm has launched new versions of its popular NBS modems with ADSL2+ and add wireless and a four-port network switch. But the company has also conceded the original single-port NBS modems it promoted as being upgradeable to ADSL2+ have a hardware incompatibility with the new standard.

"Basically, if you upgrade to the ADSL2+ firmware the modem will stop working," said a spokesperson for Netcomm. Customers will have to return their NBS modem to Netcomm for a hardware modification involving the removal of a resistor on the modem's circuit board.

The company initially tried charging \$19.95 for the "upgrade" but later dropped the fee.



More ADSL2+ coverage

In the roundup of ADSL2+ ISPs (APC July, page 72), TSN Internet (www.tsninternet.com.au) was inadvertently omitted.

At the time of writing, the company offered high-speed services starting at \$21.95 in Taree (NSW) and Fortitude Valley (QLD) and was working on enabling another 14 exchange areas in NSW. TSN is also keeping a register of people who want ADSL2+. Once 30 people who qualify for a government HiBS subsidy, or 100 standard customers, request a service in an exchange area, TSN will enable that exchange for ADSL2+. You can express your interest without committing to sign up for the service.

Your monthly guide to the best deals

APC is proud to partner with the independent broadband monitoring service Broadband Choice (<http://broadbandchoice.com.au>) to bring you the best ADSL and cable deals.

The comparison table on the following pages focuses on Internet service providers that best serve the majority of APC readers' needs. These include coverage in Melbourne, Brisbane and Sydney; and 1300, 13 or 1800 telephone support.

Only those meeting at least three of our four plan selection criteria are listed:

- Budget plan: cheapest deal under \$30/month.
- Light plan: cheapest deal under \$65/month, with at least 512Kbit/s speed and 1GB data.
- Family plan: largest download allowance under \$90/month, at least 512Kbit/s and 5GB data.
- High speed: cheapest 1.5Mbit/s plan under \$100/month, with 4GB data minimum.

If an ISP has "unlimited downloads" but speed is throttled after reaching a certain limit,

the portion in which you can get full-speed downloads is listed as its limit.

APC has picked the lowest price for a contract period of six months or less for broadband installation. Otherwise, the lowest priced option was selected. The installation price doesn't include a modem because you may get better value by buying one separately. Turn to the Best Buys section on page 58 for our recommendation of the best broadband modem/router currently available.

Can't find your provider in our list? That's because some of the largest ISPs, and many smaller ones, didn't meet the selection criteria. You may still find better deals from small ISPs that only service your local area or state.

ISPs enter their own information into the Broadband Choice database. ISPs can contact bc@whirlpool.net.au for more details.

Data for the following table was extracted from the Broadband Choice database on 7 July 2005.

BROADBAND DIRECTORY

[illegible]

Key: * ISP charges excess usage fees when you exceed your download limit; † This price only available if bundled with long distance telephony from the ISP; ‡ Additional download allowance available with this plan for use in off-peak periods; ^ ISP combines sent and received data when calculating usage.

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1 of 9

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brother

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Hyper-Threading

Also known as hardware threads, Hyper-Threading is a processor-level technology which is revolutionising computing. *Nathan Taylor* explains.



Hardware threads — or Hyper-Threading (HT), as Intel calls the technology in its own processors — are a fairly recent

phenomenon. However, the technology is starting to be implemented in a very large number of embedded and PC processors.

A processor can normally only work on one thread at a time, and switching between threads can be costly in terms of performance. Hardware threads work around this, but their effectiveness depends very much on the application(s) being run.

If your PC has an Intel processor with HT and you check your Windows System Information, it will say you have two processors installed — or four processors if you have one of the new dual-core processors with HT.

Previously, functional units and the limitations of instruction-level parallelism were discussed (APC June, page 96). In other words, a processor might have five execution units, but only be able to use three of them because of dependencies or other limitations on parallelism.

Developing multithreaded applications

Programming multithreaded applications is a complicated task, one that is expected to considerably blow out development times. Getting threads to synchronise and share data can be difficult. Non-replicable problems can arrive days into testing due to a one-off synchronisation fault, or threads might be sitting idly by while they wait for others to catch up.

It's a very challenging problem, and one likely to increase the costs of software quality control. Nonetheless, developers are going to have to step up to the plate, simply because multithreading is going to be a requirement of all software development in the near future. The good news for developers is that the compiler developers are already on it.

Intel's C++ Compiler for Windows 9.0, for instance, has the capacity to detect closed loops and spin them off as parallel threads without too much interference from the developer. But to get the most out of the new multicore architectures, developers are going to have to improve their multithread development skills.

Hardware threads work around this by presenting a "logical" processing core to the operating system. While there are no more functional units available, nor an extra physical processor, the hardware threading circuitry is saying, "This application is only using three of the five execution units; I'll allow a different application to use the other two." Or, "I'm waiting for some data from memory on this thread; I'll work on the other one while I'm waiting."

Intel's Hyper-Threading technology achieves this by using hardware circuitry at the front end of the processing cycle to merge two threads, allowing both to be scheduled to execute simultaneously. In effect, the CPU has two threads' worth of instructions to choose from when planning its execution routines.


AMD hasn't yet implemented hardware threads, probably because the value of doing so on the Athlon 64 architecture is less than that of the Intel Pentium 4 architecture (it has to do with the longer pipelines of the Intel architecture, a topic which is outside the scope of this article).

ASYMMETRIC ARCHITECTURES

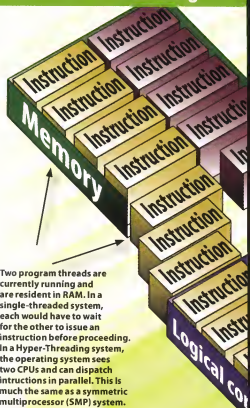
Not all multicore chips have simple multiples of the same architecture. Some take the approach that specialised cores are the way to go — one core that's good at integer calculations, for instance, and another specialising in vector calculations. Asymmetrical cores can be used to deliver massive performance figures.

Perhaps the best known approach is that used by IBM and Sony for the Cell Processor. The Cell Processor is the chip that will be used in the PlayStation 3, scheduled for release next year. IBM also has more ambitious plans for the Cell, with the intention of selling it into other platforms, such as workstations and supercomputers.

It features one PowerPC processor surrounded by eight additional cores, which IBM calls synergistic processing elements (SPEs). SPEs aren't full PC-type processing cores, but more like digital signal processors focused on churning through particular types of vector calculations at high speeds.

With all these cores available, and an anticipated speed for the processor in excess of 4GHz, the Cell is a monster on paper. But getting all the cores to work well together will be an enormous challenge for developers (see "Developing multithreaded applications", left). 

Simultaneous multithreading



Two program threads are currently running and are resident in RAM. In a single-threaded system, each would have to wait for the other to issue an instruction before proceeding. In a Hyper-Threading system, the operating system sees two CPUs and can dispatch instructions in parallel. This is much the same as a symmetric multiprocessor (SMP) system.

The logical cores that appear as two separate processors to the operating system are in fact both located physically on the CPU die. Hardware circuitry merges the threads into the scheduler.

The scheduler can have many more of its available slots filled, unlike a single-threaded processor which will have gaps. This allows the scheduler to re-order and issue a theoretical maximum of three instructions per clock cycle to the execution core.

Windows and Hyper-Threading

Hyper-Threading and other hardware threading techniques are designed to allow the software to use multithreading to make the most of the available functional units in a processor.

Hyper-Threading produces some interesting permutations when using Windows, especially older versions of the OS. Windows sees each hardware thread as a separate processor. How it deals with those depends on the OS.

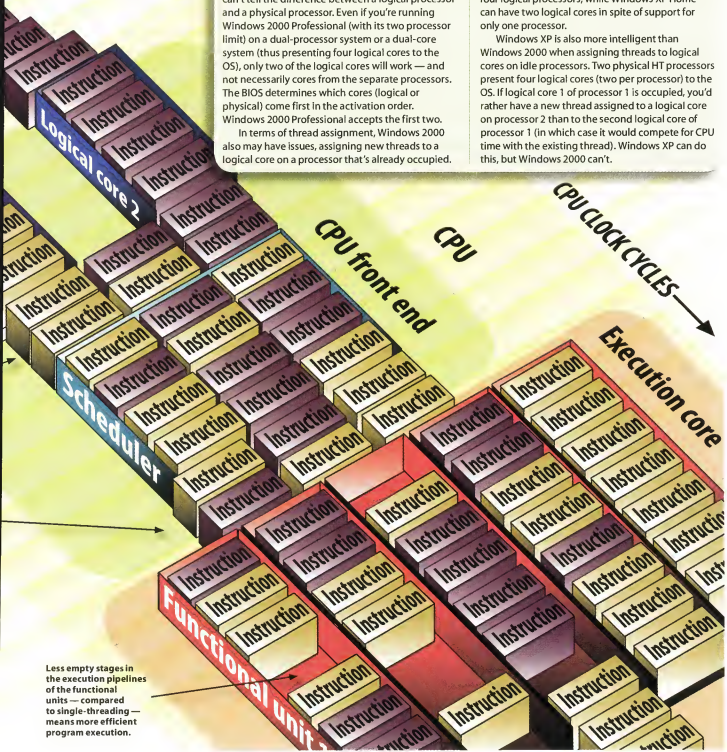
Windows 2000 is not HT-aware and treats each logical processor with equanimity. In other words, it can't tell the difference between a logical processor and a physical processor. Even if you're running Windows 2000 Professional (with its two processor limit) on a dual-processor system or a dual-core system (thus presenting four logical cores to the OS), only two of the logical cores will work—and not necessarily cores from the separate processors. The BIOS determines which cores (logical or physical) come first in the activation order. Windows 2000 Professional accepts the first two.

In terms of thread assignment, Windows 2000 also may have issues, assigning new threads to a logical core on a processor that's already occupied.

If you're using Windows 2000, it's a good idea to turn off HT in the BIOS.

Fortunately, Windows XP is HT-aware and treats a HT processor as a single processor for licensing purposes, regardless of the number of logical cores. Even though Windows XP Professional only supports two cores, it can have four logical processors, while Windows XP Home can have two logical cores in spite of support for only one processor.

Windows XP is also more intelligent than Windows 2000 when assigning threads to logical cores on idle processors. Two physical HT processors present four logical cores (two per processor) to the OS. If logical core 1 of processor 1 is occupied, you'd rather have a new thread assigned to a logical core on processor 2 than to the second logical core of processor 1 (in which case it would compete for CPU time with the existing thread). Windows XP can do this, but Windows 2000 can't.



WORKSHOP

Hands-on with hardware and software, plus bonus DVD content

A sharper image

A little tweaking is all it takes to optimise the look and performance of Windows. James Bannan shows you how.

Video card hardware is becoming increasingly complex, with dedicated video memory, shader pipelines and visual filtering. But from the Windows perspective, the heart of each graphics adaptor is the driver. Although base graphics performance is dependent on the hardware, the driver can greatly influence overall performance, and knowing which driver options you can modify is very important.

DOING IT THE ATI WAY

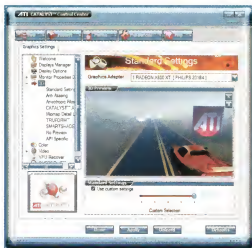
In an effort to make life easier, ATI has bundled its set of video card drivers into the Catalyst Control Center (CCC), a centralised repository of all the settings available for modification. This Workshop uses the CCC to tweak the driver settings, but first you need to install the Microsoft .NET Framework (get it from www.microsoft.com).

Once installed, the CCC can be launched from the Start Menu, the desktop's right-click option menu, or the ATI icon in the system tray.

To begin, click on View and change it from Standard to Advanced. The Welcome Screen just gives you some links — the most useful to the driver updates search on ATI's Web site (www.atl.com). The Displays Manager screen is just another way of representing the Settings tab of Windows Display Properties (right-click on the desktop, select Properties), but you can change options here such as resolution, colour quality and refresh rate.

If you have a LCD panel, there's little point changing any of these settings — they'll be automatically optimised to suit the screen's capabilities. If you have a CRT monitor, however, feel free to play around.

As a general rule, the higher the resolution, the lower the colour depth, but today's video cards only have a problem with 32-bit colour depth at resolutions above 1,600 x 1,200. If you notice a slight flickering across the screen, like vertical hold on a TV signal, then you



The 3D area of ATI's CCC is where all of the important performance tweaks are done.

need to turn up the refresh rate. Although 60Hz is a minimum, 75Hz+ gives better image quality.

The Display Options page lets you specify the same refresh rate for all applications. Select Same as desktop from the drop-down menu.

Monitor Properties and its sub-screens are only important for the reported attributes of the monitor you're using and tweaking the image position. If you've connected the card to an HDTV-capable screen or TV and it hasn't been detected properly, adjust the settings here. Otherwise, use the monitor's vertical and horizontal positioning buttons.

The 3D area is where all the main performance tweaking takes place. Here you need to make the decisions to find a balance between performance and quality. The important factor is whether you're using your machine for gaming. If not, then you can tip the balance in favour of image quality.

Go to Anti-Aliasing (AA), set it to 4x and tick Temporal anti-aliasing (an ATI feature which improves image smoothness at high framerates). Then go to Anisotropic Filtering and move the slider to 8x. Change the setting in Catalyst AI to Advanced, change Mipmap Detail Level and TRUFORM to Quality. Finally, go to No Preview and move Wait For Vertical Refresh to Always Off.

On a gaming rig, these settings make the video card work exponentially harder, possibly to the point where you get noticeable lag. So leave all the settings alone for the time being, other than changing Vertical Refresh to Always Off.

Click on the Profiles option and the Profiles Manager will pop up. Here you can create custom driver profiles, defined from particular areas of the

Skill level

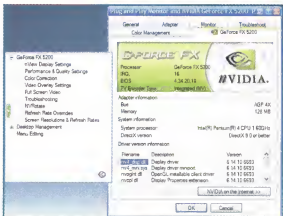
Beginner

Requirements

ATI, NVIDIA or Intel-based graphics card.

Time to complete

1 hour (approx)



The main screen of NVIDIA's driver options give you information about your adaptor, system and driver version.

hardware video card optimisation

Control Center like Video Overlay. You can then activate these profiles via a shortcut or hotkey selection, and even choose them to launch an application. This is particularly useful if you want to use different settings for video playback, games and business apps.

PREFERENCES FROM NVIDIA

NVIDIA's driver options are very similar to ATI's, but without the packaged feel of the Catalyst Control Center. Access them from Windows Display Properties by right-clicking the desktop, choosing Properties > Settings > Advanced and selecting the NVIDIA tab. You'll see a standard Properties screen with a flyout menu. The main screen gives you information about your adaptor, system and driver version. Click Performance & Quality Settings — this is where the action takes place.

Again, the options you choose affect the balance between image quality and performance. For quality, select Anti-aliasing Settings, uncheck Application controlled and move the slider to 4x. Same thing for Anisotropic Filtering, but set it to 8x. Go to Image Settings and change it to High Quality, and then take Vertical Sync off. Tick Show advanced settings, go to Force Mipmaps and change this option to Trilinear. Also set the Trilinear Optimisation, Anisotropic mip filter optimisation and Anisotropic sample optimisation settings to On.

To optimise driver performance, uncheck Application controlled for each setting, and set to Off. Image Settings can be left at Quality since the impact of doing so is minimal.

Application Profiles allows the driver settings to be customised for particular applications. For instance, you might want high image quality in general, but to tone down the settings for Doom 3 to prevent performance degradation. To do this, select the application you want to customise from the drop-down list. If it isn't there, select Add Profile and browse for the appropriate EXE file. Make the necessary driver changes and click Apply. Then you can change the Active Profile back to Global Driver Settings. Although the default list deals with games only, you could easily create custom profiles for multimedia or image editing tools.

Most of the remaining submenus should be left alone, but if you go into Screen Resolutions & Refresh Rates, you'll get the option to customise the display settings. You could do this in Display Properties, but there is also the option to add a custom display

setting. This is useful if your output is a TV or wide-screen monitor and the video card hasn't detected the supported resolution properly. You'll probably need to confirm the exact settings with the manufacturer first.

INTEL'S OPTIONS

Intel graphics adaptors are usually found in integrated systems, like motherboards and notebooks, while AMD-based systems usually use NVIDIA hardware. These adaptors are nowhere near as powerful as ATI or NVIDIA graphics chips, so there's less to tweak.


However, newer Intel hardware does have a few settings you can play with. Install the latest driver from www.intel.com, right-click the desktop and go into Properties, then Settings, Advanced and the Intel tab. Then click Graphics Properties. The screens that follow vary slightly depending on hardware.

The Display Settings screen lets you tweak the physical aspects, like resolution and colour depth. Click on the 3D Settings button, and you'll get a list of advanced options. These settings only affect OpenGL applications; Intel's graphics drivers don't support DirectX applications natively, which is why you need the latest version of Microsoft DirectX to get the full benefit from these titles. The list isn't as comprehensive as the ATI and NVIDIA drivers, and the only option available for each attribute is On/Off, or a similar variation.

For image quality, switch Triple Buffering and Force S3TC/FXT1 Texture Compression on, change Depth Buffer Bit Depth to 24-bit, and turn on Anisotropic Filtering (AF). For greater performance (and notebooks running on batteries), force all these options to off.

WORKING WITHIN THE LIMITS

If you're running a resolution of 1,280 x 1,024 or higher, don't make the Image quality settings too high. AA and AF are visual enhancements which smooth out jagged edges and textures. However, the load this places on the card goes up exponentially. Increase screen resolution from 1,024 x 768 to 1,280 x 1,024 and the number of pixels rises by 40%, even though screen area has only risen by 25%. Visual filtering interacts with every pixel, so the card is already working harder even before filtering has been applied.

If you have a high-end graphics card, raising the image quality settings won't hamper performance too noticeably. But if you have a lower-end card, or an onboard integrated card, keep the settings low. 



Intel's Graphics Accelerator Driver lets you tweak resolution, colour depth and more.

Also in Workshop

102 Internet VPN

James Bonnon demonstrates how to set up a secure VPN tunnel.

106 Audio compression primer

Daniel Winter explains how you can make the most of your MP3 player's memory with some simple compression tips.

110 Internet CSS tables

David Emberton shows you how to give your HTML design skills an added boost with Cascading Style Sheets.

112 Mastering Networking, part 2

In this month's instalment of the Mastering Networking series, David Williams sets up a wireless LAN.

116 Mastering Linux, part 10

In this month's instalment of the Mastering Linux series, Jarrod Spiga outlines some essential shell commands.

120 Solaris Networking

It's easy to set up Solaris for your home LAN. Brendan Gregg gets it up and running.

All code fragments and examples given in Workshop articles are for demonstration purposes only. Questions or comments? Email workshop@apcmag.com.

Phone home

A VPN tunnel is a secure, fully encrypted way of connecting two or more computers over the less-than-secure Internet.

Paul Schnackenburg sets one up.

The best way to link two computers over an insecure network is through a Virtual Private Network (VPN) tunnel. VPN uses an untrusted network such as the Internet as a carrier for private traffic by encrypting the entire session, in effect creating a private, secure route between two points.

Support for VPN technology is incorporated into Windows, but that doesn't mean it will automatically work. A little planning is needed, and this Workshop shows you how.

REACH YOUR HOME PC FROM ANYWHERE

A few components need to be in place for a VPN connection to be made to your home PC. First, your home computer needs to be turned on and be connected to the Internet. Although dialup connections work, data transmission is painfully slow, so a cable or ADSL connection is recommended.

Every computer has an internal IP address which it uses to communicate with other computers on a local network (if there are any). When you connect to the Internet, your ISP allocates another IP address to the network connection. If your ISP gives you the same IP address every time (fixed IP) you're all set.

To work around the problem of dynamic IP addresses, use a service such as Dynamic Network Services' Dynamic DNS (Free; www.dyndns.org). Dynamic DNS "finds" your computer when you're on the Net by linking a fixed domain name (MyHomePC.dyndns.org, for instance) to your IP address, and its client software updates the IP address whenever your ISP changes it.

1 The Dynamic DNS service is extremely useful for VPN connections, or hosting your own Web, game or mail server. It has almost 50 domains to choose from. Go to the Dynamic DNS Web site, create an account and activate it from the link in the confirmation email. Log on to the Web site, choose Add Host and then select Dynamic DNS host.

Other dynamic DNS service providers include TZO (www.tzo.com), ODS (www.ods.org) and HN.ORG (www.hn.org).

Once the domain is established, you need to install the client software. DynDNS has an "official" client for Windows (included on this month's cover DVD) but offers several other clients for every platform. Install DynDNS Updater and start it.

MAGIC TIME

2 The wizard asks whether you want to use dialup or a LAN connection. Use dialup if you have a USB broadband modem connected directly to the PC and you're using PPPoE, otherwise select LAN. If you have several hostnames/domains registered, create a group to update them simultaneously. Proceed with the automatic download and automatic update. DynDNS should find the domain as soon as your username and password are entered.

DynDNS will run as an icon in the system tray; double-click on it and go to the Options tab and select Start with Windows.

3 Some broadband routers have a built-in Dynamic DNS client. The Netgear FV5318 was used for this Workshop, though its capabilities were limited when compared to the software client.

The router must have port forwarding enabled in order for the traffic destined for your computer to pass through. The steps to enable port forwarding vary slightly depending on which brand of router you have, but should be similar to these.

Start the Web-based configuration interface for your router, click Add Service > Add Custom Service and define a new service: PPTP with TCP Port 1723. Go to Ports > Add, select your service name, action Allow Always and then enter the internal IP address of your computer. This step ensures requests for a service from the Internet (in this case, PPTP) on



Bonus DVD software

DynDNS Updater v3.0.0.5s.

Skill level

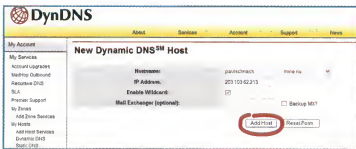
Intermediate

Requirements

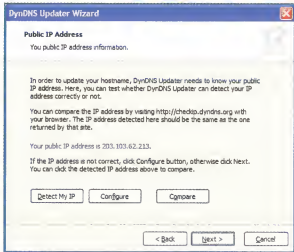
• Windows 2000 Professional/XP Home or Professional/Server 2000 or 2003 • Internet connection.

Time to complete

Varies



1 The first step in establishing a VPN tunnel is to create a dynamic DNS host using a service provider such as DynDNS.



2 The DynDNS Updater Wizard makes detecting and verifying your IP address a straightforward business.

a specific port are forwarded to the right Internet IP address.

4 Finally, configure Windows for Incoming VPN connections. Go to Network Connections in Control Panel, click Create New Connection > Next > Set up an Advanced Connection and then Accept Incoming Connections. Click Next on the devices page and then select Allow virtual private connections.

On the User page, select Add and create a new user specifically for VPN connections. Give it a hard-to-guess username and a really long, complicated password. Your home computer will be open to anyone from the Internet who has the username and password, so protect yourself. Accept the defaults on the protocol page and click Finish.

5 Right-click on Incoming Connections, go to the Users tab and select Require all users to secure their passwords and data. This step forces all connections to encrypt both the password exchange and the data transmitted.

If you want to be able to take over the screen of your computer remotely, right-click My Computer and select Properties. Go to the Remote tab and select Allow users to connect remotely to this computer. Click Select Remote Users and choose the user account you created for the VPN connection.

READY TO GO

Test your VPN from a remote computer running Windows. Go to Control Panel >

Network Connections and choose Create a new connection. Click Next > Connect to the network at My Workplace > VPN and name the connection. Windows gives you the option to connect to the Internet first if you have a dialup Internet connection on the remote computer; otherwise select Do not dial the initial connection. 6 Finally, enter your Dynamic DNS host name.

Complete the wizard to bring up a username and password dialog. For extra security, don't tick the Save this username and password box. Click Connect and it should go through Connecting to..., then Verifying username and password, and finally Registering your computer on the network.

If it doesn't connect, check all the links in the chain — home computer turned on and connected, DynDNS updater running (ping your domain name from the remote computer) and port 1723 open in the firewall. Test open ports at Gibson Research Corporation's Shields Up (www.grc.com) and make sure they are forwarded in a hardware router to your home PC. Also check the remote computer and its firewalls (if any) for possible blocking of VPN traffic.

The connected icon in the system tray will give you more info — double-click on it to find traffic statistics. The Details tab gives network information such as protocols used and the IP address your home computer handed out.

Once you're connected, the easiest way

to get to your documents is to use Remote Desktop. As long as no one is working at the home computer (Windows XP only allows one active user at a time), go to Start > All Programs > Accessories > Communications and select Remote Desktop Connection. Enter the IP address of your home computer and click Connect. Log on and you're looking at your home computer's desktop.

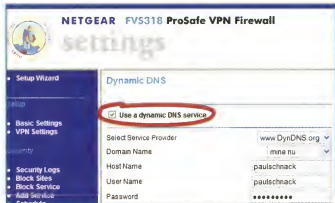
Note that earlier versions of Windows present some differences. Windows 2000 Professional doesn't have Remote Desktop as a server built-in at all, for instance, and in XP the Remote Desktop client has to be installed from CD (SUPPORT\TOOLS\MSRDPCLL.EXE).

You can still access shared folders on the home Windows 2000 computer though. On the remote computer go to Start > Run and type in \\homecomputer\share (or \\network\share), replacing the name or IP with your details and the right share name.

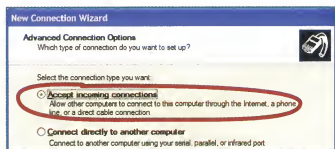
Software firewalls running on the "server" also have to be taken into account. Windows Firewall configures itself when you set up incoming VPN connections, but third-party firewalls have to be configured to allow incoming traffic on TCP port 1723. Windows 2000 Pro/XP only accepts one incoming connection at a time, whereas Server can handle up to 1,000 VPN connections.

CHOOSE YOUR DIALECT

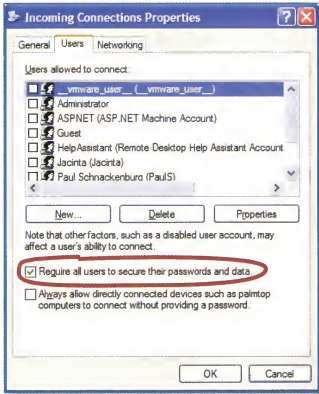
Used as VPN "servers", Windows 2000 Pro



3 The Dynamic DNS client built into routers such as the Netgear FVS318 function okay but aren't as comprehensive as software clients.



4 Setting up a new user for VPN connections potentially leaves your PC wide open, so choose a hard-to-guess user name and long password.



5 Requiring all users on the network to secure their passwords and data encrypts both password exchange and data transmission.

▶ and Windows XP support Point-to-Point Tunneling Protocol (PPTP), a Microsoft "standard", as well as the newer Internet standard Level 2 Tunneling protocol (L2TP). The latter is more secure as it uses digital certificates for authentication and IPsec to check data integrity and origin authentication.

Setting up a Certificate Authority on a Windows Server to hand out certificates is beyond the scope of this article. Windows Server 2003 also supports a pre-shared key for L2TP, which is essentially a very long password that replaces the need for digital certificates.

BRANCHING OUT

Permanent links from a branch office can also use VPN technology as a secure alternative to more expensive leased lines. In situations with many connections and locations, hardware VPN appliances or routers with built-in VPN functionality are more appropriate. In a small business situation, however, Windows Server will suffice. Before you start, decide which protocol to use and whether the connection can be initiated from either end or only the remote office can connect.

Set up an user account at each end with a very long password to authenticate the connection. For the two networks to communicate, they also need to be on separate IP subnets. This is also beyond the scope of this article, but if you haven't set up IP addressing yet you can use private address ranges (for example, 192.168.10.0-254 for one network and 192.168.20.0-254 for the other).

To prepare a Windows Server 2003 PC for a permanent VPN connection to another server, start the Routing and Remote Access Wizard in Configure Your Server > Next and then select Secure Connection between two private networks. The next page offers the choice of a demand dial or persistent connection. The best option depends on your connection technology. If you're using cable or ADSL where charges are based on the

amount of data, not time, choose persistent. If you're using a dialup connection with STD charges, select demand dial.

Finish the wizard and start Routing and Remote Access in Administrative tools. Go to Network Interfaces, right-click and select New Demand Dial Interface. Click Next in the wizard, name the interface, and then select VPN as the type of interface.

On the next page, choose your protocol and enter the external IP address of the remote router. **4** Add the internal (private) address range of the remote network on the next page and give it a metric of 1.

On the Dial out credentials page, enter the username and password already set on the remote router. Finish the wizard. For a persistent connection, right-click on the new interface, go to Properties and the Options tab, and select Persistent Connection. Now perform the same steps on the remote server and test the router by pinging a host on the remote network.

If you have an SBS 2000/2003 (Premium) network, the processes for setting up a permanent VPN are slightly different, as ISA server takes over the configuration.

In ISA 2000, start ISA Management, go to Servers and Arrays > Server name > Network Configuration. Right-click and select Set Up Local ISA VPN Server. Name the local and the remote interface and then choose your protocol. Select which end can initiate the connection and define the remote router's domain name.

Next, define the IP addresses on the remote network that should be reachable from the local network. On the next page, define the IP addresses on the local network that can be reached from the remote network (this is used to create static routes).

6 The ISA VPN wizard saves this configuration as a password-protected file that you send to

the remote server administrator for easy, error-free configuration. It automatically configures all the information in the remote site when you run the Set up remote ISA VPN Server wizard.

Test the configuration by pinging a host on the remote network. The status of VPN links (both ISA-configured and vanilla Windows Server) can be viewed in Administrative tools > Routing and Remote Access > Network Interfaces. **1111**

Inside info

■ To check your external IP address, use: <http://checkip.dyndns.org>

■ ProSafe VPN Client for Netgear VPN-capable routers: www.netgear.com/products/details/vpn011_vpn051.php

Other networking hardware manufacturers may offer proprietary software clients:

■ Step-By-Step Guide for Setting Up VPN-based Remote Access in a Test Lab: <http://go.microsoft.com/fwlink/?Linkid=43032>

■ Virtual Private Networking with Windows Server 2003: Deploying Remote Access VPNs: www.microsoft.com/technet/prodtechnol/windowsserver2003/technologies/networking/vpndeplr.mspx

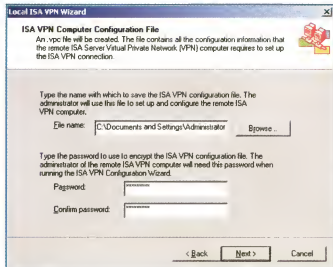
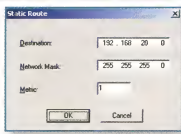
■ Virtual Private Networking with Windows Server 2003: Deploying Site-to-Site VPNs: www.microsoft.com/technet/prodtechnol/windowsserver2003/technologies/networking/vpnpls2.mspx

■ Connecting a Remote Office to a Small Business Server 2000 Network: www.microsoft.com/technet/prodtechnol/sbs/2000/maintain/remotefc.mspx



6 The wizard has almost done its work. Don't tick the Save this username and password box or you'll compromise security.

7 Add the internal (private) address range of the remote network on the next page and give it a metric of 1.



8 The ISA VPN Wizard saves your configuration as a password-protected file that can be sent to the administrator of the remote server. This file automatically configures all info in the remote site at your command.

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Audio compression primer

If you've ever run out of memory on your MP3 player, you may be due for a crash course in audio compression, writes **Dan Winter**.

When a CD is ripped to the WAV format, identical duplications of the original recordings are made. Subsequently, WAV files can usually be thought of as generic uncompressed audio files. To confuse the issue, however, a WAV file is just a container for audio data, whether it's compressed or not.

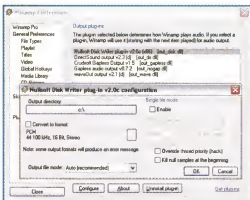
There are several other ways digital audio can be saved in an uncompressed format. Like the WAV format, AIFF, AU, VOC and RAW files are containers which store uncompressed digital audio, bit by bit, in a data file that may contain additional descriptive information in so-called file headers.

These formats were all introduced back when audio compression was still in its infancy. Because audio files were very large and CPUs very slow by today's standards, it wasn't uncommon for audio to be compressed using conventional archiving software such as ZIP or RAR files. The problem with these formats for audio was that they were slow to use, didn't save much disk space, and the files had to be extracted before they could be played back.

What was required was a compression algorithm that could be decoded in real time, but which also significantly decreased the file size of the audio. The driving force behind this venture was the MPEG project, which was becoming the standard for video compression. It utilised an audio compression known as MPEG Layer 2, MPEG Layer 2 (or MPEG-2) was good, but not good enough for compressing CD-quality audio.

INTRODUCING CODECS

When MPEG-2 was superseded by MPEG Layer 3 (MP3), the new format was quickly adopted by the



If you're converting from a format other than WAV, you can use Winamp to create the intermediary WAV files.

digital audio community as the de facto compression standard. As it was capable of compressing audio files by up to 85% without significant loss of quality, at a time when most people connected to the Internet via dialup modems, it spread like wildfire. (The word codec stands for "Compressor/Decoder" or "encoder/Decoder", depending on the context.)

An MP3 file is a container, like a WAV file, but one which is designed to store audio compressed with the MP3 codec along with descriptive information in a "tag". Because MP3 is a codec, it can be used inside other file types as well. Although it was designed for use in MPEG and MP3 containers, it can be used by other formats such as AVI and WAV files.

LOSSLESS AND LOSSY COMPRESSION

When it comes to compression, there's always a trade-off between file size and quality. At the top of the quality scale, there are codecs known by



Bonus DVD software

Awave Studio 9.2 • Awave Audio 9.2 • BeSweet 1.4 • EAC (Exact Audio Copy) 0.95 beta 2 • FLAC for Awave • LAME MP2 for Awave • LAME MP3 for Awave 3.94 • Monkey's Audio Encoder 3.99 • MPC Batch Encoder 2.3.1 • Ogg Vorbis for Awave • Thomson Demo mp3PRO Player/Encoder 1.1.0 • WinLAME 3.95.1.

Skill level

Beginner

Audio codecs

	MP3	mp3PRO	AC3	Ogg Vorbis
	The original, but definitely not the best. These days, the only reason to use the MP3 format is for maximum compatibility with hardware and software players. Unfortunately, to get the best quality when encoding you will need to use VBR, which not all players support. In this case, 128kbit/s is the bare minimum for CDs, although Fraunhofer established that 256kbit/s was the true CD equivalent.	An adaptation of the MP3 format which provides much better quality at the same bit rate. The upside is that mp3PRO files are backwardly compatible with standard MP3. The downside is that the MP3 playback in older players is at half the quality, so a 128kbit/s mp3PRO file will play back at 64kbit/s on a standard MP3 player.	The conventional DVD surround sound format. It offers very high quality compression and multiple sound channels, but isn't used much outside of DVD player software and hardware.	The open source alternative to MP3. Ogg Vorbis is a versatile format which offers excellent compression and quality. The default Ogg quality setting is Q3, and is as good as MP3 at 128kbit/s. For archival purposes, Q7 is good enough although Q10 provides the best possible quality (at the expense of a larger file).
Pros	Highly compatible	Good quality for compatible players	Good compression with multichannel support	Open source and excellent quality
Cons	Comparatively poor quality	Drops to half quality in older players	Not widely used outside DVD	Not widely supported in hardware players
CD quality	256kbit/s	128kbit/s	N/A	128kbit/s
For portable use	64-96kbit/s	32-64kbit/s	N/A	64kbit/s
How to encode it	Any CD ripper (i.e., Exact Audio Copy, or EAC) or WinLAME (using LAME encoder)	Thomson MP3Pro Player/Encoder	A DVD ripper or BeSweet	A CD ripper (i.e., EAC) or WinLAME (using Ogg encoder)

the collective term "lossless". A lossless codec guarantees that your compressed audio file sounds identical to the original and, if desired, can be extracted to make an exact copy of the original recording. A lossless codec typically provides somewhere between 10% and 40% compression.

Lossy formats, on the other hand, can compress files up to 90%, although they need to dispose of data to achieve this. This means that when you convert a lossy format back into a WAV file, for instance, the resulting file will be different to the original.

The reason lossy codecs can dispose of so much audio data without significant loss of quality is that they are based on "psycho-acoustic" models of human hearing. These models calculate which frequencies are discernible in certain combinations and which are not. By discarding not immediately apparent sounds and prioritising the dominant frequencies, much of the original data can be safely discarded.

Lossy compression is a sliding scale, however, and the amount of data discarded is largely determined by the bit rate setting.

BITRATES AND QUALITY

The bit rate of an audio file is calculated as the number of kilobits per second (Kbit/s) that are streamed from disk. A file with a high bit rate retains more data than a file with a low bit rate. Consequently, high bit rate files will be larger and of a better quality. For MP3 files, the available bitrates range from 32 to 320Kbit/s, although 128Kbit/s is the most commonly used setting.

The term bit rate only determines the resulting file size or compression ratio, and different codecs perform differently at the same bit rate. For instance, a WMA file recorded at 32Kbit/s will usually sound vastly better than an MP3 encoded at the same setting. Because compressing audio data can

be very time consuming, some codecs have an option which, when enabled, sacrifices some quality in order to reduce the compression time.

In addition to files encoded at a constant bit rate (CBR), some codecs support a variable bit rate (VBR) as well. This allows the encoder to drop the bit rate to a lower value in less complicated passages of the recording. By using VBR, it's therefore possible to produce smaller file sizes.

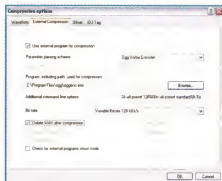
If a codec allows you to set an average bit rate (ABR), it can fluctuate as needed to ensure that you get the best possible quality at the bit rate you specify. Variable bitrates give you the closest you can get to having both good compression and good quality in a lossy codec.

STEREO AND SURROUND SOUND

Until the popularisation of the DVD format, audio codecs employed stereo channels — most conventional audio file formats are capable of containing just two audio channels. Until recently, the only way to encode multichannel audio was to resort to AC3, the format commonly used by 5.1 surround sound.

Last year, however, Fraunhofer (developer of the original MP3 standard) introduced a multichannel MP3 format capable of 5.1 encoding at bitrates comparable to conventional stereo MP3 files. Similarly, Microsoft introduced 5.1 capabilities in Windows Media Audio 9 that offer similar bitrates. The open source Ogg Vorbis also supports multiple channels, although it isn't optimised for anything other than stereo. Consequently, 5.1 OGG files are about the same size as three stereo ones.

An ordinary stereo file consists of two separate mono recordings which play back together. When it comes to compression, however, there are a couple of different ways



You can rip and encode to any format you like in EAC by specifying the encoder in the compression options window.

of representing stereo information.

Typically, a stereo file is exactly twice as large as a mono recording, so a codec that compresses stereo channels separately is twice the size of a mono version.

However, some codecs exploit the fact that the left and right channels are very similar in many stereo recordings. Instead of compressing them separately, they compress one channel and then store the difference between the two channels. The more similar the two channels are, the better the compression will be. This technique is called "joint stereo", and is found in common formats such as MP3 and Ogg Vorbis.

CODEC SHOWDOWN

So far, lossless codecs and a few types of lossy formats have been discussed. But there are dozens of codecs and file formats available for digital audio. Rather than discussing each in detail, a number of files using the most common compression types were created. These are tallied in a table with a filename and, where possible, a URL for each (see "File specifications", page 108).

The files are available on the cover DVD, complete with the original recording and the software used to perform the tests. Because so few codecs support multichannel files (plus the fact that you need a 5.1 system to play them on), only a single stereo recording was used for this comparison. For quick reference, the "Audio codecs" table on the left is a summary of the most common formats and when to use them.

CD RIPPING AND ENCODING AUDIO FILES

Whether you're starting from CD or you already have WAV files ready to go, Exact Audio Copy (EAC) will encode to virtually any format you like. If you're converting from one encoded format to another (transcoding), bear in mind that you will lose quality and won't get all the benefits of the new compression format.

To prepare WAV files for use with EAC, you can use Winamp's Nullsoft Disk Writer

WMA	APE	MPC
Windows Media Audio offers excellent compression and quality — better in many cases than Ogg Vorbis and always better than MP3. With many hardware players now supporting both MP3 and WMA, there's a convincing argument for using it as a standard. That is, of course, unless you'd rather use an open source format than a proprietary Microsoft one.	Monkey's Audio is a free, lossless compression format. It offers better quality than any of the other codecs discussed, but the file sizes are usually only about half of their uncompressed size. APE decoders are freely available for Winamp, Windows Media Player and other common media players.	Otherwise known as MPEGplus or MusePack, MPC is a high bit rate compression algorithm designed as part of the MPEG-1 specification as an alternative to MP3. It offers better quality than most lossy formats at archival bitrates, so is best suited for archival use.
Top quality and high compatibility	Good compression for a lossless codec	Excellent quality for a lossy codec
Proprietary format	Not widely supported, especially in hardware players	Not widely supported, especially in hardware players
128Kbit/s	Any setting	Any setting
64Kbit/s	N/A	N/A
A CD ripper (i.e., EAC) or Windows Media Player	Any CD ripper (i.e., EAC) or Monkey's Audio encoder	MPC Batch Encoder


► plug-in (installed by default). Select it in the output plug-ins section of the Winamp preferences window. The default location is the C:\ drive, but can be modified from the plug-in configuration window. Alternatively, EAC has a WAV decoding function available from the Tools menu. Files must begin as either MP3, WMA, MPC or APE formats to use the feature.

If you're ripping from CD, you can use EAC to create WAV files to encode later. Simply insert your CD and click the WAV icon in the left-hand toolbar. Once your WAV

files are ready, they can be encoded by selecting Compress WAVs from the Tools menu.

Before doing this, however, you'll need to configure the encoding format to be used. To do so, select Compression options from the File menu. In the Compression options window, activate the External Compression tab. Here you can select the encoder you wish to use, as well as the location of the executable file. To encode Ogg Vorbis files, for instance, select Ogg Vorbis from the Parameter passing scheme select

box and locate the oggenc.exe file in the Program field.

You can also use EAC for Windows Media Audio or other formats available internally to Windows. Disable external compression in the Compression options window, and switch to the Waveform tab of the window, where you can make a selection from a range of codecs installed on your system, including Fraunhofer MP3, Monkey's Audio, WMA and Ogg Vorbis. Here, the settings for WMA files are configured at 64Kbit/s with the high quality option turned on. 

File specifications – various formats versus standard WAV

Filename	File size (MB)	Type	Bit rate (Kbit/s)	Bit rate type	Sample rate	Channels	Bit depth	Quality setting	APC rating			URL
									Quality	Compression	Average	
WAV Original.wav	5.77	Uncompressed	1,358	CBR	44.1kHz	Stereo	16		10	0	5	
AIFF.aif	5.77	Uncompressed	1,358	CBR	44.1kHz	Stereo	16		10	0	5	
AIJ.au	5.77	Uncompressed	1,358	CBR	44.1kHz	Stereo	16		10	0	5	
FLAC (Best).flac	3.46	Lossless	499	VBR	44.1kHz	Stereo	16		10	6	8	http://flac.sourceforge.net
FLAC (Fastest).flac	3.64	Lossless	598	VBR	44.1kHz	Stereo	16		10	5	7.5	http://flac.sourceforge.net
FLAC (Med).flac	3.54	Lossless	506	VBR	44.1kHz	Stereo	16		10	6	8	http://flac.sourceforge.net
Monkey's Audio.ape	2.98	Lossless	449	VBR	44.1kHz	Stereo	16		10	7	8.5	www.monkeysaudio.com
MP2 (320kbit/s CBR).mp2	0.134	Lossy	32	CBR	44.1kHz	Stereo	16		2	8	5	http://toolame.sourceforge.net
MP2 (128kbit/s CBR).mp2	0.536	Lossy	128	CBR	44.1kHz	Stereo	16		4	7	5.5	http://toolame.sourceforge.net
MP2 (320kbit/s VBR).mp2	1.31	Lossy	320	CBR	44.1kHz	Stereo	16		6	5	5.5	http://toolame.sourceforge.net
MP3 (320kbit/s CBR).mp3	0.134	Lossy	32	ABR	44.1kHz	Stereo	16		3	8	5.5	http://lame.sourceforge.net
MP3 (128kbit/s ABR).mp3	0.591	Lossy	128	CBR	44.1kHz	Stereo	16		6	7	6.5	http://lame.sourceforge.net
MP3 (128kbit/s CBR).mp3	0.536	Lossy	128	CBR	44.1kHz	Stereo	16		5	7	6	http://lame.sourceforge.net
MP3 (320kbit/s CBR).mp3	1.31	Lossy	320	CBR	44.1kHz	Stereo	16		7	5	6	http://lame.sourceforge.net
MP3 (VBR Q0-Best).mp3	1.01	Lossy	211	VBR	44.1kHz	Stereo	16	High	8	7	7.5	http://lame.sourceforge.net
MP3 (VBR Q4-Med).mp3	0.739	Lossy	140	VBR	44.1kHz	Stereo	16	Medium	7	8	7.5	http://lame.sourceforge.net
MP3 (VBR Q8-Fastest).mp3	0.455	Lossy	72	VBR	44.1kHz	Stereo	16	Low	6	8	7	http://lame.sourceforge.net
OGG (320kbit/s CBR).ogg	0.205	Lossy	32	CBR	44.1kHz	Stereo	16		7	8	7.5	www.vorbis.com
OGG (128kbit/s CBR).ogg	0.535	Lossy	128	CBR	44.1kHz	Stereo	16		8	8	8	www.vorbis.com
OGG (320kbit/s VBR).ogg	1.29	Lossy	32	CBR	44.1kHz	Stereo	16		9	7	8	www.vorbis.com
REAL AUDIO (34Kbit/s).ra	0.142	Lossy	24	CBR	44.1kHz	Stereo	16		5	7	6	www.real.com
REAL AUDIO (80Kbit/s).ra	0.28	Lossy	80	CBR	44.1kHz	Stereo	16		6	7	6.5	www.real.com
VOC.voc	5.77	Uncompressed	1,358	CBR	44.1kHz	Stereo	16		10	0	5	
WAV (8-bit).wav	2.88	Lossy	678	CBR	44.1kHz	Stereo	8		3	3	3	
WAV (A-Low 8-bit).wav	2.88	Lossy	678	CBR	44.1kHz	Stereo	8		2	3	2.5	
WAV (AOPCM 4-bit).wav	0.739	Lossy	173	CBR	44.1kHz	Stereo	4		3	6	4.5	
WAV (GSM 2-bit).wav	0.3	Lossy	71	CBR	44.1kHz	Mono	16		6	7	6.5	
WAV (MPEG Layer 3).wav	0.536	Lossy	128	CBR	44.1kHz	Stereo	16		5	7	6	
WAV (Mu-Low 8-bit).wav	2.88	Lossy	678	CBR	44.1kHz	Stereo	8		3	3	3	
WMA (CBR Best).wma	0.711	Lossy	160	CBR	44.1kHz	Stereo	16	High	7	7	7	www.microsoft.com/windows/windowsmedia
WMA (CBR Fastest).wma	0.227	Lossy	48	CBR	44.1kHz	Stereo	16	Low	6	9	7.5	
WMA (CBR Med).wma	0.43	Lossy	96	CBR	44.1kHz	Stereo	16	Medium	7	7	8	
WMA (VBR Best).wma	1.07	Lossy	186	VBR	44.1kHz	Stereo	16	High	8	8	8	
WMA (VBR Fastest).wma	0.407	Lossy	70	VBR	44.1kHz	Stereo	16	Low	7	8	7.5	
WMA (VBR Med).wma	0.702	Lossy	122	VBR	44.1kHz	Stereo	16	Medium	8	7	7.5	

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Turning the tables

Take the plunge into Cascading Style Sheets and give your HTML design skills an added boost. *David Emberton shows you how.*



Bonus DVD software

CSS Workshop source code

Skill level

Intermediate

Requirements

Dreamweaver or other HTML editor, preferably with live preview and good CSS support.

Time to complete

30 minutes (approx)

Inside info

- Answers.com: CSS
www.answers.com/topic/cascading-style-sheets
- W3Schools, the Div tag
www.w3schools.com/tags/tag_div.asp
- Float/Clear Tutorials
<http://css.maxdesign.com.au/floattutorial>

Laying out HTML pages with tables goes something like this: design your page, imagining a cell grid complex enough to hold everything in place. Then insert content into the occupied cells and pad out any empty cells with a spacer image. This Excel-like graphical hack has been amazingly successful, underpinning the design of the majority of the world's top 100 online destinations.

However, the dominance of table-based design faces competition in the form of rich media plug-ins (Flash or Java) and Cascading Style Sheets (CSS). CSS can replace HTML tables or work with them.

CSS for layout is enabled by advances in browser technology which let style rules control almost every aspect of a page's appearance. Style sheets have long been accepted as a better way to set fonts (the tag lost), but are now also quite reliable for styling non-textual elements. And as older, less compatible browsers die out, CSS positioning will become even more practical and desirable.

This Workshop explains an original process for turning HTML table designs into a CSS equivalent. It's similar to the Dreamweaver function Convert > Tables to Layers..., except that the code is altered manually.

STRIP

1 To get a feel for the benefits of CSS, consider the sample page below, created using tables. It includes all the basic elements of a contemporary document: header, menu, main column, sidebar and footer. To achieve this, one primary table was used with no cell padding or spacing, and another "nested" table with cell padding for visual effect. To hold each element in place, empty rows and columns have been used in conjunction with copies of a blank spacer image.

The CSS version is simpler. All up, the nested table arrangement includes a total of 25 cells. Those cells all need to be there, even though only five contain content. The final CSS layout features only five "cells" in the form of <div> tags.

The first step in converting from tables to CSS is the easiest: get rid of the tables. To do so, open the file named original.html in the sample folder on this month's cover DVD. (A demo of steps 1 to 5 is also provided in case you get stuck.) You can edit in a text editor or an HTML authoring package.

Delete any code that belongs to the tables, specifically the <table>, <tr> and <td> tags, plus any spacer images embedded in them. To make things easier, these sections of table code have been well separated from the rest of the HTML so you can simply select the unwanted lines and remove them. If you need a visual guide, compare the source of original.html and step1.html.

2 When all the table code has been removed, save the edited file and preview it.

STRUCTURE

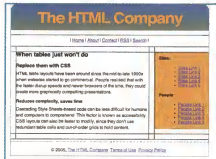
Now start adding the CSS layout. Each distinct part of the page is wrapped in a <div></div> tag, so it can be named and styled accordingly. Div is short for division, referred to as a layer in Dreamweaver. Adding divisions provides a stylable skeleton and gives the page some needed semantic structure.

Proceed by reviewing all the HTML code between the <body></body> tags in your document. Place a <div id=""> before each section of the content, and a </div> after, and set the div id attributes accordingly. You should end up with the following sections: header, menu, main, sidebar and footer.

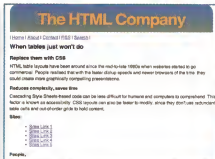
Note: If you use Dreamweaver in code view, it automatically inserts a closing tag as soon as you type <div> (or any other paired tag). Cut and paste this </div> to the correct place, don't duplicate it, or you won't be enclosing the necessary elements.

Removing the HTML table code also strips the sidebar of its background colour. Test the <div> structure by adding the background in CSS format.

If you look in the <head> section of your page, you'll see an inline style sheet. This is a standard Dreamweaver insertion for XHTML-compliant pages which have margins set via the Modify > Document Properties... dialog. In this case the page's top and left margins are set to 20 pixels, to push the design



1 Here's the sample page using table-based HTML design. This Workshop reproduces it using CSS.



2 The table code sections are clearly separated from the rest of the HTML. Here's what the page looks like with the table code removed.



3 Text has spread across the full width of the page by default. Start on the sidebar by first reinstating its background colour.

away from the top corner. These values can be 0 pixels, to eliminate the corner gap, depending on the demands of your layout.

Below the body {} statement block, inside the inline style sheet, insert a new rule for the div sidebar, then save and preview:

```
div#sidebar {
background-image: url(sidebar.jpg);
}
```

All the style rules used from now on are similar to this one. Statement blocks begin with a tag class (div) and an element ID (#sidebar), and then a set of attributes and properties between brackets {}. You will sometimes need to go back and expand an existing block to set new attributes. This is as simple as hitting Enter and typing an extra line between the brackets. Or you can use the CSS panel in Dreamweaver to edit the styles.

SIZE AND ALIGN

At the completion of the previous step, enough styling information was added to give the sidebar its background. However, all the <div> sections are of unspecified size, taking up the width of the page by default. The next stage adds height, width and text alignment values for all the tags which need it.

Start by amending the div#sidebar {} rule so that it includes the following:

```
width: 170px;
```

Then add each of the these new blocks:

```
div#header {
width: 728px;
height: 100px;
}
div#menu {
width: 728px;
text-align: center;
}
```

```
}
div#main {
width: 488px;
}
div#footer {
width: 728px;
text-align: center;
}
```

Pay close attention to the div#main {} rule. Don't set the height attribute because the amount of content in a "main body" area will often change. Likewise, an element can have a specific height without typing in a width. If no pixel count is specified, the browser calculates both automatically as the page loads. Text alignment will be left unless specified otherwise (i.e., by text-align: center;). Save and preview the page.

FLOW

Now it's time to change the way your divisions are stacked so that they start to resemble the original table layout. CSS uses two parallel concepts, float and clear.

Unless a <div> is floated to the left or right, it will take up all the horizontal space available, regardless of its set width. If several divs are floated in succession, however, they will bunch up until forced to wrap to a new line. In this way, it's possible to mimic the appearance of columns. The clear attribute acts a bit like a line break, preventing floated items from appearing to the left or right side (or both) of a cleared element.

From now on, all the style rules you need have already been created. So, using your HTML or text editor, add these new attributes:

Rule	New attribute(s)
div#main	float: left;
div#sidebar	float: left;
div#footer	clear: left;

Notice that div#footer is set to clear: left; so that it appears underneath the main column and the sidebar. Save and preview.

SPACE

Until this point, existing table code has been stripped from a page to pick out the content, which was then styled using <div> tags. Styles for sizing and text alignment were added, and the flow of the document altered. The only thing left to handle is spacing.

CSS spacing for block elements comes in two varieties (unlike inline elements such as hyperlinks, which don't typically have their own spacing). Margins are external, and padding is internal. Unlike cell spacing and padding for tables, CSS margins and padding aren't the same.

Note that backgrounds don't show up in margins, and that padding is subtracted from the height and width of any element it's applied to. Margins and padding can be negative numbers (although caution is advised), and the left, right, top and bottom values can all be set separately.

To complete your page's transformation, add the following code:

Rule	New attribute(s)
div#menu	margin-bottom: 10px;
	margin-left: 20px;
div#main	margin-right: 10px;
	margin-top: 20px;
	margin-bottom: 10px;
	margin-left: 10px;
div#sidebar	margin-top: 20px;
	margin-bottom: 10px;
	padding: 15px;
div#footer	margin-top: 10px;

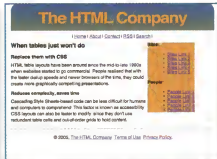
Save and preview the document again. It now looks identical to the tabled version, but has the advantage of being easier to read in code form and less difficult to modify. You've now completed the five-step process and can apply it successfully in the future.



Once the background colour has been reinstated, the width of the main body text and dimensions of the sidebar are set.



The final stage is to reflow the page so that each element appears in its original position, with the sidebar back on the right-hand side.



To the casual observer the page is exactly the same as when you started. However, the code is now easier to read and modify.

Mastering networking, part 2

Now even modest home networks can easily go wireless.

Stephen Withers explains how to set up a wireless LAN.

Skill level

Beginner

Requirements

Wireless access point
• wireless adaptor.

Time to complete

Varies

In this series . . .

Part 1 — August '05

Part 2 — September '05

Wireless networking

Part 3 — October '05

Setting up wireless networks

Continued on page 112

The introduction of Intel's Centrino chipset for notebooks started the boom, but wireless capability is fast becoming a feature of new desktop PCs such as Apple's revised iMac G5, released in May this year.

Presently, there are three wireless standards in operation: 802.11a (with a theoretical maximum speed of 54Mbit/s), 802.11b (11Mbit/s), and 802.11g (54Mbit/s). Unfortunately, real world speeds aren't even close to the nominal speeds. The best option for most users is 802.11g since it's fast, affordable and compatible with both 802.11a and b.

"Super G" Wi-Fi products combine two or more 802.11g channels for greater throughput, but this can cause interference between adjacent networks. Multiple input, multiple output (MIMO) devices use a different technology to transmit a number of data streams on one channel via multiple antennas for greater throughput (one vendor claims 45Mbit/s), with greater range as an additional benefit. However, mixing MIMO devices from different manufacturers usually results in normal 802.11g speeds.

INSTALLING A WI-FI ADAPTOR

If your desktop computer lacks a wireless interface, adding one is easy and reasonably inexpensive. A wireless interface costs two or three times that of an Ethernet interface, but even so, well-known brands are advertised for as little as \$50. Read and follow the manufacturer's instructions carefully, especially when installing the drivers.

1 Disconnect all the cables from your computer, and then double-check it isn't still connected to the mains. Remove the cover (the screws are typically located at the back) and connect a grounding strap (around \$15) between your wrist and the metal chassis. This reduces the risk

of damage being caused by static discharge.

2 Now remove the blanking plate from one of the unoccupied PCI slots. Usually this just involves removing a screw, but a few cases require you to twist a partly cut plate back and forth until it separates from the back panel.

Remove the wireless card from its protective bag and insert it into the expansion slot. This takes a fair amount of pressure, which makes it something of a nerve-racking business the first time you do it. Ensure the card is correctly aligned in the slot, perpendicular to the motherboard, and press firmly — there's usually a distinctive "thunk" as it seats.

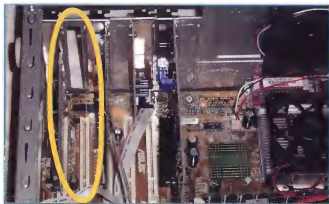
Secure the card's bracket to the back panel of the chassis using the screw which previously held the blanking plate (the case pictured uses a clamp arrangement instead), remove the grounding strap from the chassis and replace the cover.

3 Screw the antenna into the socket on the outside of the bracket, being particularly careful to avoid crossed threads. Then reconnect the power and peripheral cables.

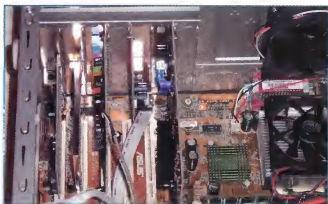
4 Many current notebooks are already wireless-enabled. If yours isn't, it may be possible to retrofit an internal adaptor. This is probably the most convenient way, as there's nothing external to lose or damage, but it may require professional installation.

If that's not an option, you may be able to use a PC Card adaptor. Expect to pay upwards of \$80, depending on features. All you need do is install the software, restart if directed, and then push the card into the slot. Most models protrude a couple of centimetres, so consider removing the card before transporting the notebook. Alternatively, ensure it's appropriately packed to avoid any strain on the card or internal connectors.

5 The alternative for notebooks or desktops is a USB adaptor. This saves messing around inside and, at around \$60, is cheaper than a PC Card adaptor. USB 1.1 ports are fast enough for 802.11b, but not for 802.11g. So, if you don't have a (spare) USB



1 The first stage in setting up your wireless network involves some manual labour — opening the box and finding an unused PCI slot.



2 Put the wireless card into the expansion slot. This requires correct alignment and just enough pressure to make it a bit nerve-racking.

Adaptors and access points



5 If you don't want to mess around inside your PC, a USB adaptor, like this one from Linksys, is a reasonably priced alternative.



6 Apple's AirPort Extreme is a typically elegant bit of kit that makes having the AP on display less aesthetically irksome.



7 This AP from D-Link lacks the Apple's looks but works well and comes with a print server and multiple parallel, USB and Ethernet ports.

2.0 port, it's probably better to go with an internal or PC Card adaptor. Since your Internet connection is most likely slower than USB 1.1 it's not crucial, though you will notice the difference when transferring large files between devices on your WLAN.

ACCESS POINTS

While you can create an ad hoc network between two wireless-equipped computers, it's more common to use them in conjunction with an access point (AP). This essentially performs the same task as a wired network's switch (see APC August, page 102), and allows the computers to talk to each other.

Most APs aimed at the home and small business markets include a router, allowing the WLAN to connect to another network — usually the Internet. Routers will be covered in more detail in the next instalment of this series.

4 The majority of network equipment can be tucked away out of sight, but if you want to cover your entire premises, the only suitable location may be in full view. Consequently,

you may want to select a model with an aesthetically pleasing design. For style, it's hard to go past Apple's AirPort Extreme.

An access point normally requires two cables, one for power, the other for Ethernet. Some models support Power over Ethernet, a standard that uses spare conductors in the twisted-pair cable to carry low-voltage power for tidier and easier installation.

If your access point also serves as a router for your wired LAN, two Ethernet cables are required — one to the broadband modem, the other to a switch or to a wired device. Apple's AirPort Extreme also features a USB print server and a built-in modem.

7 If the unit's appearance isn't a high priority, it's worth checking out the additional features provided by some access points. For instance, the D-Link DI-824VUP+ used in this series of Workshops includes a print server with parallel and USB ports, a four-port Ethernet switch, and a modem connection as a fallback for a failed broadband link. Ways of increasing the range of a WLAN will be examined in a future instalment of this series.

WLAN SECURITY

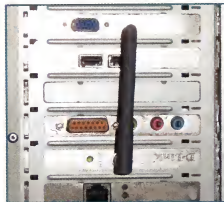
In the early days of WLANs, manufacturers put ease of use before security. Consequently, many people have set up WLANs that are accessible by neighbours or people sitting in the street. Simplicity and ease of use is good, but most people also want to keep their data and communications private, not to mention preventing others from leaching resources.

5 The base level of security is WEP (Wired Equivalent Privacy), which is effectively no security at all. You should use WPA (Wi-Fi Protected Access) unless your equipment doesn't support it — in which case you should think hard about replacing those components with newer gear.

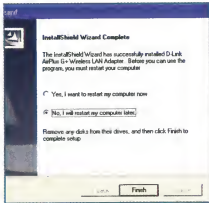
Home and SOHO networks are unlikely to include a RADIUS authentication server, so you'll need to use WPA-PSK. PSK stands for "pre-shared keys" and it refers to a passphrase that is entered on each wireless client and used to generate the keys for encrypting transmissions. If the client's passphrase matches the AP's, a connection is accepted. The problem is that passphrases are vulnerable to "dictionary attack" — indeed, there is software around that make such attacks child's play.

For now, about the best you can do is generate a random 63-character passphrase (it's not really a passphrase as it isn't made up of words) and use that. If your equipment imposes a lower character limit, just make the passphrase as long as you can. The problem with a random passphrase is that you'll need to write it down somewhere as it's practically impossible to memorise but necessary in order to add devices to your network.

It's a good idea to change your AP's SSID (Service Set Identifier, sometimes called the Network ID) from the default, which is often the name of the manufacturer or model, providing interlopers with information that could help them attack your system. There's also the possibility that a



3 The next step is to screw the antenna into the socket on the outside of the wireless card's bracket, being careful to avoid crossed threads.



4 A PC Card adaptor is an option if your notebook isn't wireless-enabled. Install the software, restart, then push the card into the slot.

▶ neighbour's AP has the same SSID, which could be confusing. Randomly generated names might suggest you've got something worth hiding, but you don't want to reflect your hardware ("Linksys"), identity ("Jones") or address ("Flat3"). Consider something neutral such as a colour or the name of a bird.

8 Most APs advertise their presence, which makes them easier to connect to. You might prefer yours to sit quietly until it is addressed. That way, others won't see it when they try to connect to their own access point, but you can still readily connect bona fide guests.

Look for "disable SSID broadcast" or similar in the manual or help files. Since even a moderately skilled intruder can obtain your AP's SSID by listening while a client connects, this is more a matter of privacy than security.

Another simple way to improve security is to reduce the AP's power level to prevent the signal spilling any further outside your premises than necessary, though that's less practical for apartment dwellers. Some people advocate putting a time switch on

the power supply so the access point is automatically turned off when you're asleep or at work, but that could be inconvenient unless your habits are very regular.

Remember to change the username and password that protects the AP's settings. The defaults are widely known.

PC SETUP

So you've installed a Wi-Fi interface in your computer and set up an access point. How do you tell Windows to make the connection?

10 Ideally, an icon representing the network connection will be visible in the Start bar. Right-click on it, and select View Available Wireless Networks. If the icon isn't there, hit Start > My Network Places. Click on View network connections, then right-click on the wireless connection — it's probably labelled Wireless Network Connection. Select View Available Wireless Networks.

11 In the list of available networks, you should see the SSID (in this example, N) assigned to the AP. If it's there, select it and

click Connect. If you also see a neighbour's network, do the right thing and ignore it! If you specified a key when setting up the AP, you'll be asked to enter it twice. Then click Connect and you should be online.

If you disabled SSID broadcasting, it's a little more complicated since your network won't appear in the list of available networks.

12 First of all, click Change the order of preferred wireless networks. Then click Add in the Wireless Networks tab of Wireless Network Connection Properties.

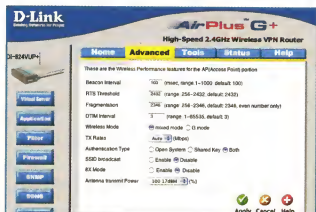
13 In the Wireless Network Properties window, type in the SSID and set the authentication and encryption methods (all to match your AP settings), click OK, and OK again. You should be online after a few seconds. **ETC**

Next month . . .

Part three looks at the selection and setup of a router that will connect your network to the Internet and improve its security.



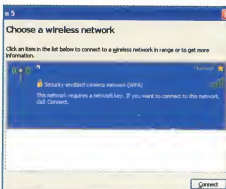
8 Home and small business networks should use WPA-PSK for authentication. PSK stands for "pre-shared keys".



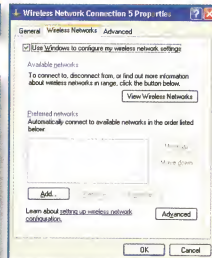
9 You can make your wireless network less visible by disabling SSID broadcast and reducing the AP's power level.



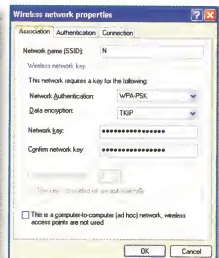
10 An icon in your Start bar should tell you whether or not a network connection is available.



11 Your network is ready. Don't be too surprised if a neighbour's network also shows up.



12 If you disabled SSID, your network won't show up in the list of available networks...



13 ... which means you'll have to add it in the Wireless Network Properties window.

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The table below details what all of these special characters are, and some common usages. The hash (#) is used as the next character in the filter because all comment lines in a configuration file will start with one.

Special characters	
^	Matches the beginning of a line.
\$	Matches the end of a line.
.	Matches any single character.
*	Matches zero or more occurrences of the previous character.
[]	Matches any of the characters between the brackets.
Frequently used constructs	
/./	Matches all lines containing at least one character.
/^./	Matches lines containing only one character.
/^#/	Matches all lines starting with a hash.
/^\$/	Matches all blank lines.
/) *\$/	Matches any line ending with a closed-parenthesis followed by zero or more spaces.
/[xyz]/	Matches any line beginning with a lower case x, y or z.

SEARCH AND REPLACE

4 The example above is fine for deleting entire lines of output, but what if you need to remove a few words from any given line in a file? The search and replace function of sed is useful for this.

Imagine a text file containing a large amount of data and a few confidential email addresses. The following command could remove those email addresses from the file:

```
cat document.txt | sed 's/[:blank]:
[:graph:]*@[:graph:]*[:graph:]*
[:blank:]/<confidential>/g'
```

Dissecting the sed command, the first character to address is s (for substitute). What appears between the first two forward slashes is the search string — [:blank:] matches any space or tab character, while [:graph:] matches any visible character.

The search term looks for a space or tab, followed by zero or more visible characters (the alias), the @ character, then zero or more characters (the domain name, minus the top-level domain suffix), then a period (.), then zero or more characters (making up the suffix) and finally, another space or tab. The string appearing between the second and third forward slashes is what is substituted into the area matched by the search string.

Lastly, the g (global) option replaces all instances of the search string on all lines. If you don't use this option, only the first email address on each line will be replaced, leaving the rest visible.

Overall, sed is a very powerful command line tool capable of much more than has been demonstrated in this Workshop. A more in-depth sed tutorial can be found at <http://www-106.ibm.com/developerworks/linux/library/l-sed1.html>. Of course, the sed man page is also very useful, albeit brief.

SHELL VARIABLES

Variables are a fundamental part of most shell scripts. In the same way that variables are used in algebra, values can be assigned to shell variables, with each defined by a unique name. There are two methods to using variables:

1. Declaring the variable is usually done by assigning a value to a unique keyword using the equals sign. For example, to abbreviate the location of where the web root on your system is located, you could define:

```
www=/var/www/html
```

2. Using variable substitution to access the contents of a variable by preceding the variable name with a dollar sign. Using the example above, change the working directory to your web root by entering:

```
cd $www
```

You can find out what the value of a variable is

at any time by echo-ing it to the shell:

```
echo $www
```

ENVIRONMENT VARIABLES

Another special class of variables exists on a Linux system. Environment variables provide the shell with instructions as to how it should behave under certain conditions. The most frequently used environment variable is PATH.

PATH contains a list of directories that hold executable commands or scripts. When you enter a command into the shell, it first searches the present working directory for the command.

If the directory can't locate it, it searches the locations defined in the PATH variable in order until the command is found. If the command isn't found in any of the PATH locations, an error message will appear.

Consider the echo command. It's actually located in the /bin/ directory on Fedora systems. Because of the PATH variable, you can enter the echo command regardless of your location in the directory tree. You can find out what the PATH variable on your system contains using the method described above:

```
echo $PATH
```

When viewing the PATH, note that the /home/<user name>/bin directory appears in it. This means the shell will look in the bin directory inside your home directory when searching for commands. This location is one of the best places to store any shell scripts you create.

Editing the PATH variable is as simple as re-declaring it. Remember to consider the notation of the variable (use the output from echo as a guide); the order of execution; and to keep the existing locations in the PATH available. You can refer to the PATH variable while re-declaring it:

```
PATH="/home/<user name>/scripts:
$PATH"
```

```
[admin@berlin httpd]$ tail -f access_log | sed '/^127.0.'
203.113.252.165 ~ - [12/Jun/2005:05:00:31 +0000] "HEAD / HTTP/1.0" 200 - "-" "B1
gBrother/2.30"
203.113.252.165 ~ - [12/Jun/2005:05:02:31 +0000] "HEAD / HTTP/1.0" 200 - "-" "B1
gBrother/2.30"
203.113.252.165 ~ - [12/Jun/2005:05:04:31 +0000] "HEAD / HTTP/1.0" 200 - "-" "B1
gBrother/2.30"
203.113.252.165 ~ - [12/Jun/2005:05:06:31 +0000] "HEAD / HTTP/1.0" 200 - "-" "B1
```

B The sed command can be used to filter out sections of screen output. For instance, to remove Web server log entries relating to local addresses.

USING QUOTES AND BRACES

One of the most common problems encountered when writing scripts results from not using (or incorrectly using) quotation marks. For instance:

```
NAME=APC Magazine
```

attempts to assign APC to the `NAME` variable, and then execute the `Magazine` command (which probably doesn't exist on your Linux system). To get a whole name assigned to the variable, you need to surround it with single or double quotation marks — that way, the shell doesn't treat what appears after the space as an argument.

Double quotation marks should be used when you need to group words together but still want some level of command and variable substitution to occur. Single quotation marks should be used to assign data to variables literally. Consider the commands below:

```
LINE1="I read $NAME."
LINE2='I read $NAME.'
```

Because double quotation marks are on the first line, variable substitution is used during the assignment operation, and the value assigned will be `I read APC Magazine`. A literal assignment is used in `LINE2`, and its value is `'I read $NAME.'` The same principle applies for command substitution.

It's especially important to remember the distinction between single and double quotation marks. In most cases, use double quotes to allow substitution. Single quotation marks should be used when you're dealing with strings containing dollar signs.

Braces can also reduce ambiguity in scripts and are used by the shell to discern where a variable name begins and finishes.

```
BRAND="Coca"
echo ${BRAND}Cola
```

Using the previous example, the shell would have attempted to echo a variable named `BRAND-Cola` if the braces hadn't been included. However, the braces inform the shell that the variable that you're using is a name brand, and to append the `-Cola` string to the variable in the output.

A BASIC SCRIPT

A shell script is a plaintext file that contains commands that the shell executes in a procedural fashion. Since they are plaintext, they can be created by any text editor, including vi or pico.

The first line of your shell scripts should contain the `#!/bin/sh` characters followed by the path to the interpreter which is used to execute the script. Since you're using pure shell commands, your shell scripts should start with:

```
#!/bin/sh
```

You may have previously seen a similar line at the start of Perl scripts which informs the shell that the Perl Interpreter needs to be used to process the script. The syntax used in those files is different, but a syntax that Perl understands.

After you've defined the interpreter, you can start entering the commands that make up your script:

```
ORIGINAL="$1"
ARCHIVE="$2"
lpr "$ORIGINAL"
cp "$ORIGINAL" ~/backup/mastering_
linux_"$ARCHIVE"
```

The `"$1"` and `"$2"` variables are substituted for the first and second arguments to the script automatically. The first two lines assign these arguments to more user-friendly variable names. The third line prints the

contents of the file parsed as the first argument. The last line copies the file specified as the first argument to a backup location, and names it in accordance with the second argument.

EXECUTION

Once you've finished writing the script, save it (remember, keep your scripts in `~/bin`) and exit from your editor. You can now run the script by entering:

```
sh ~/bin/<script name> <arg1>
<arg2>
```

where `<script name>` is the name of the file that you saved your script as. This method of running your script isn't the most optimal. By passing the script location to the shell command, you're not taking advantage of the contents of the `PATH` variable.

To make it easier to run your script, use `chmod` to change the permissions of the file so that it's executable:

```
chmod u+x ~/bin/<script name>
```

Once you've done this, you can run your script from any location in the file system simply by calling its name as a command. And since the script is located in your home bin directory, the shell will be able to find the script by using the `PATH` variable.

Next month . . .

Part 11 of the Mastering Linux series will cover conditional statements, control structures and other script coding methods. It will also briefly demonstrate some techniques for customising your X-Windows experience.

```
[admin@berlin httpd]$ tail -f woues_log | sed s/127.0.0.1/localhost/g
205.113.252.165 - - [12/Jun/2005:05:02:13] +0000 "HEAD / HTTP/1.0" 200 - "-" "B"
gBrother/1.30"
205.113.252.165 - - [12/Jun/2005:05:04:15] +0000 "HEAD / HTTP/1.0" 200 - "-" "B"
gBrother/2.30"
localhost ~ - [12/Jun/2005:05:05:03] +0000 "GET /index.html HTTP/1.0" 200 10263
 "-" "wget/1.9.2"
205.113.252.165 - - [12/Jun/2005:05:06:15] +0000 "HEAD / HTTP/1.0" 200 - "-" "B"
gBrother/2.30"
205.113.252.165 - - [12/Jun/2005:05:08:15] +0000 "HEAD / HTTP/1.0" 200 - "-" "B"
gBrother/2.30"
localhost ~ - [12/Jun/2005:05:10:02] +0000 "GET /index.html HTTP/1.0" 200 10263
 "-" "wget/1.9.2"
205.113.252.165 - - [12/Jun/2005:05:10:31] +0000 "HEAD / HTTP/1.0" 200 - "-" "B"
gBrother/2.30"
205.113.252.165 - - [12/Jun/2005:05:12:15] +0000 "HEAD / HTTP/1.0" 200 - "-" "B"
gBrother/1.30"
205.113.252.165 - - [12/Jun/2005:05:14:31] +0000 "HEAD / HTTP/1.0" 200 - "-" "B"
gBrother/2.30"
localhost ~ - [12/Jun/2005:05:15:03] +0000 "GET /index.html HTTP/1.0" 200 10263
 "-" "wget/1.9.2"
```

```
[admin@berlin admin]$ NAME=APC Magazine
bash: Magazine: command not found
[admin@berlin admin]$ echo $NAME
[admin@berlin admin]$ NAME=APC Magazine
[admin@berlin admin]$ echo $NAME
APC Magazine
[admin@berlin admin]$ LINE1="I read $NAME."
[admin@berlin admin]$ echo $LINE1
I read APC Magazine
[admin@berlin admin]$ LINE2='I read $NAME.'
[admin@berlin admin]$ echo $LINE2
I read $NAME.
[admin@berlin admin]$ BRAND="Coca"
[admin@berlin admin]$ echo ${BRAND}Cola
CocaCola
[admin@berlin admin]$ echo ${BRAND}Cola
CocaCola
[admin@berlin admin]$
```

4 Alternatively, `sed` can be used to replace information in order to make things easier to read.

5 The proper use of no, single or double quotation marks is imperative to creating useful scripts, as is the use of braces.



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Into the Solaris system

Solaris is a fantastic platform for networking. **Brendan Gregg** explains how to set up the OS for a home LAN.

Solaris is a reliable and secure networking platform, with much of the Internet driven by its servers and firewalls. After installing the OS (APC July, page 112), the next step is to set it up for networking.

In a home LAN, Solaris can fill numerous roles, from simply connecting to your LAN to taking a key role as a firewall for your Internet connection. Once networked, a wide range of other services may be activated on Solaris — a Web server, FTP server, DHCP server, NFS server, and so on. But first, Solaris must be configured to connect to the network.

This Workshop discusses configuring Solaris 10 on your LAN, connecting to the Internet, and setting up the IP Filter firewall provided with the operating system. The information also applies to OpenSolaris.

CONFIGURING NETWORKING

There are two main ways to configure networking on a Solaris install — either by answering the networking questions asked during the installation process, or by manually editing files post-install.

Although the former approach is the simplest, the latter is probably more common, and equally straightforward. Issuing the `sys-unconfig` command returns the system to a cleanly installed state. Reboot and you've it re-ask those install questions. If you've customised a few system config files, running `sys-unconfig` will lose all customisations. Which is the point — if you have made a mistake with your configuration, you get a fresh start.

If `sys-unconfig` didn't work, you want to customise things further, or you just want to learn how things work underneath, you'll need to edit the text files at various points. Select one of the available editors: `vi` — text only, for experienced users; `dpad` — simple GUI (`/usr/dt/bin/dpad`); and `jedit` — cute GUI (`/usr/demo/jds/bin/jedit`).

To manually set up networking:

- Check interface was detected
- Put hostname in `/etc/hostname.*`

- Edit entry in `/etc/hosts`
- Edit entry in `/etc/inet/npnodes`
- Reload network settings
- Check networking works

Remember that to configure the network you need administrator access and therefore must be logged in as root. Don't worry about picking the wrong values if you're unsure how precisely to configure the system — the settings are easily changed. Besides, you can always go back to step one of the manual setup at any time. You can even go right back to `sys-unconfig` if you're really stuck.

1 Check that your network interface has been detected by Solaris. Use `ifconfig -a` to list all interfaces, then the `plumb` option to initialise available interfaces, and another list to see what you found. In this example, only `lo0` (loopback) was detected initially. After a plumb, `rtls0` was found. If you're unlucky, you'll still only have `lo0` after the plumb, in which case see "Driver difficulties" (right).

■ Determine your hostname by typing `uname -n` or reading `/etc/nodename`. Use this hostname for your first network interface. Edit a `/etc/hostname.<interface>` file (`/etc/hostname.rtls0`, for instance), place the hostname in there and save. If you're configuring multiple network interfaces, each `/etc/hostname.*` file needs a different name.

■ Edit the `/etc/hosts` file (actually a symlink or shortcut to `/etc/inet/hosts`). The left column is the IPv4 address, the right contains aliases or names. You might discover your hostname is already associated with 127.0.0.1, along with the alias localhost. In this case, delete the hostname word. Choose an IPv4 address; if you don't already have one in mind, a private address such as 192.168.1.1 is a good choice (see RFC 1918 for clarification). Add a new entry for your IPv4 address and hostname; if your hostname was mars, the entry would be 192.168.1.1 mars.

■ Make the same change as with the `/etc/hosts` file to the `/etc/inet/npnodes` file. The `npnodes` file contains both IPv4 and IPv6 addresses, and many programs prefer reading hostnames from this location. Just to be sure, edit both `/etc/hosts` and `/etc/inet/npnodes`.

■ With the files updated, the configuration must be re-read. Reboot the server using `init 6`. This command was often used on earlier versions of Solaris to ensure the new configuration would read correctly at boot. Solaris 10 features Service Management Framework (SMF) to track boot services. SMF allows the `svcadm restart network/physical` to be used for re-reading the network config, thus avoiding the reboot.

■ Now check that it all works. Connect your Solaris

Skill level

Intermediate to advanced

Requirements

Solaris 10 (the full version was provided on the APC July cover DVD).

Time to complete

2 hours (approx)

```

Terminal
Window Edit Options Help
# ifconfig -a
lo0: flags=2001000043<UP,LOOPBACK,RUNNING,MULTICAST,IPv4,VIRTUAL> ntu 8232 index
1
    inet 127.0.0.1 netmask ffffffff
# ifconfig -a plumb
lo0: flags=2001000043<UP,LOOPBACK,RUNNING,MULTICAST,IPv4,VIRTUAL> ntu 8232 index
1
    inet 127.0.0.1 netmask ffffffff
rtls0: flags=1000043<BRIDGE,ST,LOOPBACK,RUNNING,MULTICAST,IPv4> ntu 1500 index 2
    inet 0.0.0.0 netmask 0
    ether 0:d:88:27:f3:e2

```

1 Check that your network interface has been detected by Solaris. Use `ifconfig -a` to list all interfaces, then the `plumb` option to initialise available interfaces.

server to a LAN where you can ping another configured host, or use a crossover cable to connect directly. This other host should be configured with an IPv4 address on the same subnet, e.g., 192.168.1.2.

To troubleshoot, print all the modified config files, check `/var/adm/messages` for any messages related to the interface and read the output of `ifconfig -a` carefully—the system won't work properly with an incorrect netmask or broadcast, or if the UP flag is missing.

DRIVER DIFFICULTIES

Solaris 10 on SPARC architecture should work fine, but it's not uncommon to run into driver difficulties on x86 architecture since there are so many different types of network card available. Versions of Solaris for x86 have been around since Solaris 2.1 in 1992, and driver support has expanded with each release. Support in Solaris 10 x86 is good, and should improve rapidly with the help of the OpenSolaris crowd.

The first stop for questions about network drivers is the hardware compatibility list (HCL) (www.sun.com/bigadmin/hcl/data/sol).

For cards not on the HCL, try `prtconf` to see if a device node matches your network interface as printed on the summary screen after power on (or read through a `prtconf -vp`). If you think you know which driver should be attached to this device, `update_drv` may be attempted to create a driver alias.

The final command will look something like `update_drv -a -i 'pci1186,1301'` `rTls`. Get more information at www.sun.com/drydog.com/faq or <http://www.solaris-x86.org/software/drivers>. A forum is located at <http://forum.sun.com/> `forum.jspa?forumID=271`.

CONNECTING TO THE INTERNET

Setting up an Internet connection with an ADSL or similar router is straightforward. A modem takes much more configuration. Either way, there are many variations on how your ISP delivers its service, and for some, getting connected can be a challenge. It's highly unlikely that your ISP will provide documentation on setting up Solaris, so you're on your own to some extent.

For ADSL (or similar) where a router provides the Net connection, the following steps should help you get configured:

- Configure a network interface
- Configure routing
- Test the interface
- Test routing
- Configure DNS
- Test DNS

■ If you've been given an IP address with your Internet connection, add an entry for it to both `/etc/hosts` and `/etc/inet/ipnodes` with its own name, e.g., `mars-ads1`; then add the following line to your `/etc/hostname.<interface>` file:

```

root:/
root:/
root:/ cat /etc/ipf/ipf.conf
### TCP Inbound
pass in quick proto tcp from any to any port = 22 keep state
block in log proto tcp from any to any

### TCP Outbound
pass out quick proto tcp from any to any keep state

### UDP Inbound
### UDP Outbound
### ICMP Inbound
### ICMP Outbound
root:/
root:/ ipf -Fa -f /etc/ipf/ipf.conf
root:/
root:/ ipfstat -ionh
S B1 pass out quick proto tcp from any to any keep state
I B1 pass in quick proto tcp from any to any port = ssh keep state
4 B2 block in log proto tcp from any to any
root:/
root:/

```

2 This sample ruleset from IP Filter, the firewall built into Solaris 10, allows all outbound TCP, inbound SSH, all UDP and ICMP.

```
addif mars-ads1 netmask
255.255.255.252 broadcast +
```

using an appropriate netmask. This creates a virtual interface on the same interface.

■ Create an `/etc/defaultrouter` file containing the IP address of your router.

■ Run `svcadm restart network/physical`, check your interfaces have configured correctly with `ifconfig -a`, then try to ping your router address.

■ Check a default route has also appeared using `netstat -rn`. Try to ping something on the Internet, for example 203.18.241.20—the IP address of www.apcmag.com.

■ DNS is configured by creating an `/etc/resolv.conf` file containing one or more `nameserver <IPv4 address>` lines, then running `cp /etc/nsswitch.dns /etc/nsswitch.conf`.

■ Test DNS with either the `nslookup` or `dig` tools, e.g., `nslookup www.apcmag.com`.

If you have a DHCP address, you can configure your primary address using DHCP by creating an `/etc/dhpc.<interface>` file, and making your LAN address as a virtual using `addif` in the `hostname` file. This process is much easier if you have two network cards and can dedicate one to connect to your router.

For a modem setup, create a config file and a chat script. To get started, read through `/etc/ppp/peers/mysp.tmpl`. As always, back up the entire `/etc/ppp` directory and subdirectories. For PPP and PPPoE

documentation, see <http://docs.sun.com/app/docs/doc/816-4555>, chapters 15 to 23.

IP FILTER FIREWALL

IP Filter, a capable firewall with a text-based interface, has been included with Solaris 10 after many years as a freeware firewall. The following is a summary of the commands required to set it up:

```

Load rules,
ipf -Fa -f /etc/ipf/ipf.conf

List rules,
ipfstat -ionh

Load NAT,
ipnat -CF -f /etc/ipf/ipnat.conf

List NAT,
ipnat -l

Check examples,
more /usr/share/ipfilter/examples/*

```

To get IP Filter running in Solaris, edit `/etc/ipf/pfil.ap` and uncomment the driver name for your interface. Run `svcadm enable ipfilter` and reboot. After booting, check that your interface has a new `pfil` module attached by using `ifconfig <interface> modlist`.

Now edit the rules. Examples are provided in the directory named above, and a how-to can be found at www.obfuscation.org/ipf.

2 This is a sample ruleset to allow all outbound TCP, inbound SSH, all UDP and ICMP. Set up `syslog` to send local0.warning somewhere and test that the firewall really does block what it's supposed to. **BTC**



Down time

High-performance playtime

That's a flash player!

Helen Chen and Dan Warne check out flash MP3 players, versatile picture viewers and Bluetooth music adaptors.

SanDisk Sansa E100 **1337**

▲ **Upsides:** awesome (and awesomely tiny) MP3 player with up to 1GB built-in flash memory and an SD card slot for unlimited expandability. Has an iPod-like interface with artist, album and genre-based selection. Excellent in-ear headphones with rich bass. Doubles as an SD card reader with supplied USB cable.

▼ **Downsides:** non-rechargeable — AAA battery only. List scrolling is done using a stiff wheel on the top right-hand corner. No AAC support.

Details

Online	www.sandisk.com/retail/sansa.asp
Price	512MB, \$229; 1GB, \$329
Verdict	★★★★☆

Comsol SD-MP3

▲ **Upsides:** this is a real bargain! Couple this \$59.95 player with the cheapest 512MB SD card you can find (such as the \$59.39 SanDisk one from www.hboutlet.com.au) and you've got yourself a cut-price iPod shuffle. Keyping notch is a helpful design feature.

▼ **Downsides:** it has all the style and elegance of a toilet seat. Only 10 hours' playback from the non-rechargeable AAA battery. No screen.

Details

Online	www.comsol.com.au
Price	\$59.95
Verdict	★★★★☆

Kodak EasyShare Picture Viewer

▲ **Upsides:** a lightweight (68g), credit card-sized picture viewer with a bigger and clearer screen than those found in most digital cameras. Better functions than bulkier MP3 players that have photo viewing as an afterthought. Fantastic quality 2.5in screen and fast zoom/pan functions. There's 32MB of built-in memory, and an SD card reader for more. Optional Kodak EasyShare Printer Dock allows you to print photos directly from it.

▼ **Downsides:** too expensive. Who would pay \$199 for it? Doesn't accommodate CompactFlash cards, nor can it download directly from a digital camera via USB.

Online	www.kodak.com.au
Price	\$199
Verdict	★★★★☆

Samsung YH-925

▲ **Upsides:** a 20GB MP3 player that can download pictures from cameras. 1.8in colour screen. Capable of accommodating digital rights-managed WMA files along with MP3 and OGG. Boasts CD quality voice recording, yet costs \$50 less than the 20GB iPod Photo.

▼ **Downsides:** compatible with Windows XP only. Relies on a proprietary "Y" cable for connection to the PC and the separate charger. Won't work with cameras which use proprietary protocols such as PictBridge. No AAC support. Screen is definitely not as good as that of the iPod Photo (more like a mobile phone screen).

Details

Online	www.samsung.com.au
Price	\$449
Verdict	★★★★☆

iPod Camera Connector

▲ **Upsides:** small dock-connector-to-USB converter that allows you to import files directly from a digital camera into your iPod Photo. You'll never run out of memory card space on your camera again (provided your iPod's battery doesn't go flat).

▼ **Downsides:** Apple should have included the functionality in iPod Photo in the first place. Downloading from the camera is slower than the rated USB 2.0 speed by a long shot, presumably because the iPod has to render thumbnails. And despite this, you can't play downloaded photos to a TV — you have to synchronise with iTunes before you can do that. Slightly kludgy process.

Details

Online	www.apple.com.au
Price	\$48
Verdict	★★★★☆

Tiny video cameras

Miniaturisation hits high-quality 3-CCD video recorders — about five years overdue, says Dan Warne.

JVC Everio GZ-MC500

▲ **Upsides:** uses a 4GB CompactFlash form factor micro-drive to record high-quality 3-CCD video in a palm-sized package. Squeezes an hour of footage into 4GB by using MPEG-2 compression. Five megapixel still photo capability.

▼ **Downsides:** recording in MPEG-2 means precise frame-by-frame editing isn't possible (but it does allow editing precision of up to a quarter of a second). Pricey.



Details	
Online	www.jvc.com.au
Price	\$2,799
Verdict	★★★★☆

Panasonic NV-GS150

▲ **Upsides:** one of the smallest 3-CCD video cameras we've ever seen at 7.1 x 7.3 x 12.3cm (WHD). Keen pricing for a camcorder with excellent colour clarity. Standby mode means you can shoot within two seconds of startup. Built-in lens cover is a nice touch.

▼ **Downsides:** DV tapes are so turn-of-the-century compared to the JVC. Doesn't handle low-light conditions very well. Only 2.3 megapixel still photos.



Details	
Online	www.panasonic.com.au
Price	\$1,759
Verdict	★★★★☆

Creative Bluetooth Headphones CB2530

▲ **Upsides:** wireless digital 'phones that use a Bluetooth link to your MP3 player. The supplied Bluetooth dongle plugs into any headphone jack and transmits to the headphones. Rich bass. Light and comfortable on your head.

▼ **Downsides:** expensive, and the sound has a noticeably "digitally compressed" quality. Separate Bluetooth dongle is a bit kludgy and inconvenient.



Details	
Online	http://au.creative.com
Price	\$179.95
Verdict	★★★★☆

iCombi AH10 wireless headset

▲ **Upsides:** these also double as a mobile phone headset, muting the music when you get an incoming call! Small, neat dongle clips onto the iPod's accessory slot, creating the Bluetooth link to the phones. Headphone-mounted buttons then let you control the iPod remotely. Awesome!

▼ **Downsides:** half the cost of the 20GB iPod itself. Ouch!



Details	
Online	www.expansys.com.au
Price	\$229.95

Belkin TuneStage for iPod

▲ **Upsides:** connects your iPod to your home stereo wirelessly. Bluetooth dongle clips transmits to a small receiver at your stereo, which connects via standard RCA or 3.5mm headphone jack to your stereo.

▼ **Downsides:** the Bluetooth transmitter depletes older iPods' already crap battery life even further. And excuse us while we hyperventilate over the price.



Details	
Online	www.belkin.com.au
Price	\$239.95

MindCandy Volume 1 PC demos DVD

Remember the heady days of the early '90s, when demo groups would use assembly coding to squeeze incredible graphics and sound out of woefully under-powered PCs, long before the advent of 3D graphics accelerators? Although it's nearly impossible to run these demos on modern PCs, the MindCandy DVD allows you to watch all the best demos from Future Crew, EliteGroup, Triton and more in pristine quality on your TV or PC. If you're feeling particularly masochistic you can still download the original demo installers too. Coming soon: Volume 2, Amiga demos.



Details	
Online	www.mindcandydvd.com
Price	US\$21 (including postage)
Verdict	★★★★★

LEGEND Downtime ratings

UBER	Super, super cool
1337	Super cool
NOOB	Uncool, (as in newbie)



Fan-tatt-istic: sometimes a brother has to go for a run to maintain peak form.



Happy trails: CJ, doing a little dirt.



Chopper bleed: that's definitely not the Golden Gate Bridge, no sir.

Grand Theft Auto San Andreas

Justin Kranz heads to San Andreas in a boosted Porsche for the latest instalment in the Grand Theft Auto series and finds it's the best action-adventure game yet — on any platform.

Within every form of artistic endeavour, there's a breakaway element, an avant-garde group. You can argue that gaming's perceived lack of maturity in the past was due to very little celebration or room for radical elements. After all, having fun is big business.

In gaming, the radical element has become the template for others to follow. Rockstar Games takes risks and pushes through the accepted norms of the gaming industry, and has reaped huge rewards as a result. The latest Grand Theft Auto game, San Andreas, is merely the most polished yet in a majestic series of titles.

You're Carl "CJ" Johnson, a gangbanger returning to Los Santos (read Los Angeles) following a family tragedy. Before long, you're back in the thick of gang intrigue, and your rise through the ranks of gangsterdom is punctuated by the spread of your turf and command of your soldiers. It's pure '90s gang movie, and it's utterly credible. There's no reliance on the video or sound to get the job done — they're satisfactory, but nothing groundbreaking. All the focus is poured into pushing the story.

Playing the game itself — viewed through a pulled-back, third-person perspective — is made as simple as possible. Some elementary arcade skills

are required, for gunplay in particular, but the game emphasises freedom. The main plot arc is always there for you to pick up on when you're ready, but if you simply wish to boost cars for a while, maybe graffiti half of the countryside, or just go postal on the local population, the options are all there. You don't play your way through San Andreas, you browse and sample the experience.

Traditional GTA playing style rules in San Andreas. Everything from BMX bikes to cars to aircraft are controllable in game, and there are plenty of weapons to use, as well as a scaled proficiency approach. Details such as CJ's physique change depending on whether he's been fed and exercised, but never in a way that overwhelms the plot. There's plenty of cross-country travel involved too; you're by the beach one second, at the Sands (the hotel in Vegas, that is) the next.

The primo talent behind the voice acting roles — everyone from Samuel L. to Chuck D has some lines — guarantees constant exposure to quality. And the soundtrack brings home all the flavour of the period. (If you aren't happy with the supplied tracks, you can even throw in your own MP3s.)

Grand Theft Auto San Andreas elevates gaming beyond the mechanical process that bogs down just about every title on the market. It's probably the best example of true interactive fiction on the market — you focus more on experiencing the story than mastering a control sequence. This is Rockstar's edge over the competition. While it's telling stories, the other guys are playing games.

The lowdown

▲ **Upsides:** puts plot before mechanics, with the focus on telling stories.

▼ **Downsides:** visuals don't match the storyline.

Details

Contact	Take 2 Interactive
Online	www.grandtheftauto.com
Price	\$89.95
Verdict	★★★★★



Behind you: "La-la-la! Not listening! Can't see you!"



Teamwork is essential: "Hey Hector... are you sure this is the way to Macca's?"



The pink afterburners mark this out as an obviously Commie plane... and one with an exhaust that sounds like a Bronx cheer.

Battlefield 2

If you're willing to pay the admission price — a top-end video card — welcome to the greatest FPS experience on PC.

Battlefield 1942 was the catalyst for massive change in the FPS market. Gone was the longstanding 16-layer limit. Also gone were the small maps and the clunky "kind-of" vehicle additions so prevalent in first person shooters. Mod makers rejoiced at the platform's potential, and set about modifying the game's scope. Chief among these offerings was Desert Combat, a "total conversion" of the game that took it into modern times.

Battlefield 2 (BF2) is the best first-person shooter experience available to date. Forget Doom 3 and Half-Life 2 because this game pushes the boundaries so much further. For hard-core team FPS fans, buying BF2 is a foregone conclusion.

The biggest problem with Battlefield 1942 was its visuals. The terrain looked okay, but the player models were underdone. Not any more — this game is a visual masterpiece on high detail. Dynamic shadows, grit, dust and some of the most intricate outfits and vehicles now grace the modern battlefield, and the ghillie suits actually make the characters look like easily-camouflaged Wookies instead of guys smeared with texture.

No matter how jaded a gamer you are, it's hard not to take a stroll through the contested territories in BF2, which include sunny locales like Iraq and China, without being overwhelmed at just how much is going on. Sixty-four players roam ruined

streets, the buildings draped in sniper-friendly scaffolding, while artillery screams and jets howl. The first time you see a gunship loom over the crest of a hill and train its ordnance on you, you get an inkling of how important it is to operate as a team.

Lone wolves have a rough time in BF2. Not only does the game include VoIP channels that allow different squads of players to communicate, one player on each team is elected commander, thus taking a strategic role. A dud commander means artillery strikes don't eventuate, positions get lost, and good players run low on supplies.

This is one of those special titles that covers so much ground, playing the demo is compulsory, despite the annoying control configuration scheme and the fact that it's aimed at people with video hardware that's less than 18 months old.

This is a masterwork for experienced FPS fans, though there's a steep learning curve for anyone who hasn't really come to grips with games exceeding eight players per side (single-player mode is once again just a succession of missions with CPU-controlled teammates and enemies).

BF2 is the progression of the FPS platform, as opposed to just zapping space aliens or demonic beasts. Sure it can be uncomfortably relevant in a geopolitical sense, but this is EA catering to a growing market of mature, hard-core gamers. Bravo.

The lowdown

▲ **Upsides:** vehicular variety, balance, and the graphics on high detail.

▼ **Downsides:** If you don't have a high-end video card, the experience just isn't the same.

Details

Contact	Electronic Arts
Online	www.battlefield2.com
Price	\$99.95
Verdict	★★★★★

Top 5 TV titles that should have games

Okay, we've had the *ER* game, the *CSI* game — heck, there's even been a *Dukes of Hazzard* game. And all pretty ordinary. Here's some superior fodder.



DEADWOOD

How many good videogames have been made out of westerns? Even Rockstar faltered with *Red Dead Revolver*, its ode to the spaghetti variety. It was a good enough game, but players just didn't get the joke. On the other hand, *Deadwood* — the HBO show set in the mining town of the same name — is 80% drama and 20% black comedy, a formula that should succeed in game format. Not only that, the content of the show — a set

storyline broken into episodes — lends itself well to stage-based play. And best of all, the action is violent, the language gratuitously blue and the plots multitudinous. Just think of the possibilities involved in playing the likes of conniving barman Al Swearengen, pure-as-the-driven-snow lawman Seth Bullock or even flamboyant Wild Bill Hickock in a historically accurate action-adventure title. Hell, there could even be a gold mine/resource management subcomponent.



THE SOPRANOS

If it's good enough for *The Godfather* to rate a video game — and it does, albeit without the blessing of Francis Ford Coppola — surely *The Sopranos* is equally worthy. As a TV series, it's certainly earned its stripes in a more convincing fashion than the debauched mess that was *Godfather 3*, for instance. And *The Sopranos* is tailor-made for a gaming approach, with potential dripping from the licence

like crystalline beads of sweat from Tony's troubled brow. There's the guns, the beheadings, even golf clubs to play with. Figuring out a kick-off point isn't a big drama either. Start off as an minion with lofty ambitions and work your way up through the ranks, employing all of your guile and treachery to undermine those above you. Kind of like the Labor Party, except with a clearer vision... and better relations with unions.



THE OFFICE

The BBC original, of course. Authentic voice acting, likenesses of everyone's favourite characters, uncomfortable silences, Keith's Ali G outfit, the smarmy IT guy... the lot. And what better way to portray *The Office* than a Sims-style format. Naturally, it would be impossible to go past David Brent as the ideal protagonist, juggling office mismanagement with the kind of disastrous social life that makes Shane Warne look

like James Bond with a faux-hawk. The Office: The Game could be the first Sims/Tycoon-style title that limits its goals in a sensible fashion — you're not there to save the world or turn your company into a global megacorporation, you're there to... retain your job. Now there's a theme that resonates strongly in this bold new world of Australian industrial relations reform! Of course, playable in single player only. In cyberspace, nobody wants to hear Ricky Gervais' guitar.



JACKASS

Here's a no-brainer, and we're not just talking about the collective IQ of the crew of masochists who comprise the *Jackass* team. Yeah, the licence may have had its day, but heck, *Big Brother* is still on the idiot box. So there's no reason not to flog this particular equine carcass just that little bit more. All the elements are there — the MTV label, executive producer Spike Jonze's relentless quest for publicity, and a pack of young blokes

willingly to write themselves off for cheap thrills. If you don't think there's an "extreme" sports game in there somewhere, you're not looking hard enough, gramps. Think of the much-coveted female demographic drawn in by the photogenic stars on the cover alone. And as an added bonus there's the extra publicity the game publisher would effortlessly generate from the tabloid shows running a campaign against "killer games — teaching our kids self-harm".



FRESH PRINCE OF BEL-AIR

The concept? Something funky, something fresh. Kind of like *Back to the Future* meets *First Blood*. Travel back in time in your candy-apple red Iroc (source: "Who Stole My Car?" by DJ Jazzy Jeff & the Fresh Prince) and attempt to change the course of cinematic history by hurting Will "Fresh Prince" Smith. We're talking perma-hurt here, so what better format than a first person shooter? If you think that's a little extreme, the prosecution

presents exhibit A: *Hitch*. And let's not overlook exhibits B (*Wild Wild West*) and C (*Bad Boys 2*). Long-suffering souls unfortunate enough to be exposed to the Fresh Prince's musical back catalogue may wish to grab an expansion pack that allows you to dust him before he gets a recording deal. Jeeves, fetch my white tuxedo on the double — we're on a mission to arrest American cultural imperialism! Prime the flux capacitor and let's away in the DeLorean!

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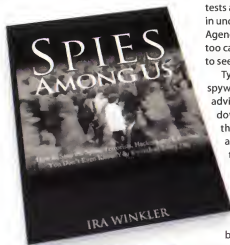
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Spies Among Us



Details

Publisher	Wiley
ISBN	0764575910
Price	\$44.95

Asserting that 99% of successful security attacks are preventable, *Spies Among Us* author Ira Winkler tests and breaks security for a living, having started in undercover work with the US National Security Agency. He claims that today's victims are often too caught up with media-hyped boogiemen to see who or what is really harming them.

Typical recommendations regarding installing spyware and virus detection are given, but the advice in this book goes far beyond locking down a PC. It promises to help readers protect themselves from the world's "super spies", as well as the burglar next door, by revealing the methods and motivations behind information theft.

Winkler doesn't propose to eliminate all security threats. Rather, he gives measured suggestions about assessing risk, deciding the value of what's likely to be stolen at any given time and then setting security expenditure accordingly. The ideas work on an individual and company level, although the focus of *Spies Among Us* is decidedly corporate.

While the book does recommend the installation of anti-spyware and firewall software, the clear message is that technical measures aren't enough.

All information is valuable, Winkler asserts, whether it's stored on a computer, in an employee's brain, or even on a messy desk.

The book is divided into three parts. In the first, Winkler pimps his experience in the world of espionage to explain how the spying game works. The second part features Winkler on safari, stealing nuclear power plans and other fancy items from his rich clients. The third and final section gets down to the details of creating and implementing a security program, in broad but shallow detail. While it gives readers a sense of where to begin, detailed instructions will have to be found elsewhere.

Probably the weakest aspect of *Spies Among Us* is the theme of post-9/11 "terror hype". The publisher had asked that this be de-emphasized for fear of dating the rest of the material, but apparently the author didn't listen. Again, it's the media-hyped boogiemen, but Winkler has a point — such things do distract us from more mundane and real threats. If only he could have found a way to say it that didn't seem like an ongoing rant against popular culture. Ignore this aspect and you'll be in possession of a fine spy book.

David Emberton

Blocking Spyware & Spam For Dummies

Unlike the broader, more dramatic approach of *Spies Among Us* (see above), *Blocking Spam & Spyware*... focuses on the specifics of improving email and Web security within a small to medium-sized company. While it certainly has the potential to inspire home hobbyists, this is primarily a business book written for the benefit of IT workers, owner-operators and system administrators. It's a complete blueprint for rolling out an enterprise-wide security upgrade, with chapters on training and staff support, giving seminars, and the calculation of ROI.

Four main sections cover the nature of the malware problem, how to select and deploy the right tools for fighting back, and ongoing maintenance. A fifth section features handy "lists of 10", such as the top 10 software products for spam and spyware protection.

The text is comprehensively researched and detailed, filled with historical tidbits, commonsense advice and knowledge of the latest software strategies. Like other *Dummies* books, *Blocking Spam & Spyware*... comes with a removable cheat sheet and free online updates. The glossary is limited, but it still runs for seven and a half pages.

You might wonder why spam and spyware should be covered together. This is one of the challenging aspects of *Blocking Spam & Spyware*... because it forces the reader to switch mental gears from one chapter to the next.

However, the mechanisms behind both of these recent threats are well delineated and much of the battle strategy is the same for each. As such, this is a recommended resource, despite this minor flaw.

David Emberton

Degunking Microsoft Office

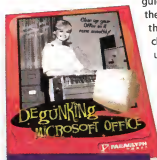
To the software aficionado, *Degunking Microsoft Office* will seem a very stupid book indeed. Customise menus and clean up mail folders? Like, duh. But lurking beneath the cloying cuteness and endless repetition of the word "gunk" there's actually some decent information.

The degunking of Office is described as a 12-step program. Each step comes as a chapter comprising several tasks, laid out with plenty of screenshots and bullet point lists. These steps are meant to be performed in the order in which they're laid out, and will realistically take a busy person several weeks, maybe even months, to accomplish. For quicker cleanups, authors Christina and Wayne Palala have created lists of key tasks that can be squeezed into a half day, or even just a few minutes.

With so many versions of Microsoft Office out there, *Degunking* does an amazing job of staying version neutral, with most of the text equally applicable to Office 2000, XP and the latest editions of 2003. A thorough guide to purchasing and installing the suite is also included, as well as thoughts on deciding between a clean install or an upgrade. For the uninitiated, this kind of information holds real value.

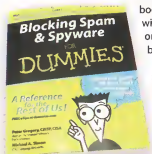
Of course, a review of *Degunking Microsoft Office* wouldn't be totally complete without mentioning the cover. In keeping with the series' 1960s theme, it features an apparently vacant young woman standing next to a filing cabinet, and an inset computer screen filled with absolutely nothing. Take from that what you will.

David Emberton



Details

Publisher	Paraglyph Press
ISBN	1932111956
Price	\$39.95



Details

Publisher	Wiley
ISBN	0764584685
Price	\$42.95

Beginning Programming

Beginning Programming is a mixed bag. While the cover states that the book is from "Programmer to Programmer", it's really for beginners.

The first few chapters describe the fundamentals of programming. Readers are gradually introduced to the building blocks of computer programming, including numbering systems and operators. One small complaint is that this section features a couple of large tables spanning multiple pages — they should really have been located in the appendix.

Software tools are discussed, with the authors recommending UltraEdit, UltraCompare, SnagIt and Nero. Unfortunately, all are commercial applications — the only freeware alternative offered to UltraEdit is Windows' Notepad. Thankfully, readers aren't expected to buy a copy of Microsoft Visual Studio.

The chapter goes on to explain the installation of Java and Borland C++ compilers but again this

information should have only appeared in the appendix.

Following the software chapter comes the introduction to programming. Commenting, variables, inputs and outputs, functions, control logic, arrays and more are described, along with many clear examples. However, they are illustrated using different languages, including JavaScript, C++ and VBScript, causing some confusion.

Some useful information is included on problem solving, debugging, UI and file management, as well as some unnecessary chapters on modifying the Windows registry and version control. The chapter titled "Distributing Your Project" is largely redundant given the target audience.

The only thing stopping *Beginning Programming* from being an essential text is its lack of focus.

Peter Sbarski



Details

Publisher	Wiley
ISBN	0764584065
Price	\$61.95

Java 5 Illuminated

An excellent and comprehensive introduction to Java, and to programming in general, *Java 5 Illuminated* would be of greatest use to first-year computer science students. While it's more academic — at least in terms of style — than many other introductory books on Java, the explanations are very clear and concise.

Core programming ideas and Java itself are introduced in the first few chapters (however, there's no mention of debugging), along with an abundance of well-crafted questions, exercises and projects for readers to complete along the way.

Initially it seemed odd that applets and graphics are introduced before flow control and arrays. However, this is done deliberately as the applets developed are extended in the following chapters.

All Object Oriented Programming principles (Classes, Encapsulation, Inheritance and so on) are

well explained, and the diagrams accompanying the text are excellent. For instance, the explanation of recursion, a subject which is often a sticking point for students, is very clearly written. In fact a whole chapter, with many interesting examples, is generously allocated to this subject.

Java 5 Illuminated outlines some algorithms and data structures — binary search, bubble sort, selection sort, linked lists, stacks, queues and doubly-linked lists are all described and implemented. However, there's no mention of insertion sort, quick sort or merge sort.

Finally, there's a relatively thorough and descriptive chapter on Graphical User Interfaces.

Java 5 Illuminated is a first-rate textbook for students or those seeking a succinct introduction to Java. Highly recommended.

Peter Sbarski



Details

Publisher	Jones and Bartlett
ISBN	0763716677
Price	\$119.35

Databases Illuminated

This modern, up-to-date database text isn't a reference guide for any specific database system or implementation (such as Oracle or SQL Server), but a comprehensive work that gives a solid theoretical foundation in this very important topic.

Starting with a historical overview, *Databases Illuminated* progressively works through the entire process of decomposing a real world scenario into a functional database system. Each chapter concludes with projects for readers to complete.

The book is outstanding in breadth and depth. For instance, both entity-relationship (E-R) diagrams and the unified modelling language (UML) are covered. Further, while the emphasis is strongly on relational databases there is also some reasonable background and detail on the object-oriented network and hierarchical database models. XML is introduced as a means of sharing data on the Internet and between disparate database systems.

It would be wrong to simply dismiss this as a textbook — there is a sound practical element. The author doesn't stop at explaining how to create a database but goes on to cover advanced topics in security, transactions, optimising queries and data mining, and warehousing. These delve into fundamental low-level issues, such as properly determining which index to cluster to maximise performance, which are often neglected.

The book is easily read, and examples are given predominantly in Microsoft Access for the earlier chapters and then Oracle for later, more complex issues. Illustrations and tables supplement the text, helping to clarify the concepts presented.

This is one of the best new database texts on the market. It's excellent for students, but is also a tremendous reference for database and software professionals.

David Williams



Details

Publisher	Jones and Bartlett
ISBN	0763733148
Price	\$99



PIMPIFY

Chip Chat allows us APC Lab Rats to indulge our dumbest fantasies. Like being plays. So online name generators are tops because they prove we have Macktastic Skillz in... wotever. There's no proper reason to mention the Pimpify name generator at PlayerAppreciate.com, we just like being Iced out in fine pimp gear. And Labs Editor John Gillooly now demands to be addressed as Dopestastic G. Shizzle. But we'll try and spin a weak anecdote around name generators in general as an excuse to urge you to Pimpify.

Name generators — they've come along way, eh? Once just a cool engine that some geek scripted to generate names around a theme, the name generator has become big biz. If you're too grown up for a pimp handle, don't let that stop you wasting time with the ultimate name generator at Rum and Monkey (<http://rumandmonkey.com>). Here you can set the kind of name you want, like The douchebag name generator. Or Your stripper name. If you get sick of this, seek help.



POETIC JUSTICE

It warms our collective heart to know there is so much love in the world for tech. Just think what Byron could have done with inspiration of graphics cards. APC reader Wayne Bendikas has led the charge and written us a poem.

Roses are red
Violets are blue
Eight bits to a byte
And binary makes two

Load, configure and throughputs a must
Pump it and shunt it, through quad frontside bus
Megahertz and gigahertz, raw power for me
Processing clock cycles as fast as can be

Megabytes and gigabytes, makes storage a breeze
SATA not PATA for me if you please
RAID configuration with redundancy built in
So data lost won't end up in the bin

AGP, GPU, pipelines galore
Pixel shaders, vertex shaders, fill rate and more
Lightning graphics, electrons full tilt
With APC this monster I built

So thank you for, a great magazine
Without you to guide me, it would be just a dream.



BOOM HEADSHOT

If you've seen the video www.putfile.com/media.php?n=FPS-Doug, you've got an inkling of what the cleaners see when they dare to step into the APC Labs on a Friday after 5pm. Once Battlefield 2 is running, the Lab Rats each become a version of the psychotic freak in this gamer parody. And they're not joking. Key lines from this masterpiece aptly relate to APC staffers playing BF2.

Justin Kranzi: Boom headshot, boom headshot, boomooooom heeheeaaad shhhhhot.

William Maher: I can dance all day, I can dance all day, try hit me, try.

Dan Warne: My heart's beatin', my hands are shakin', but I'm still shootin'.

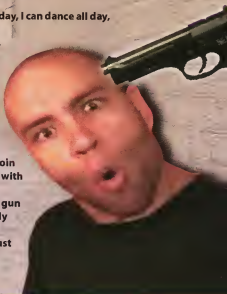
Nick Race: So uh, this is my PC here, it owns. It OWNS!!!

Garth Montgomery: Wanna go for a jog, man? What, everyone runs faster with a knife!

John Gillooly: Maybe I wanna join the army. It's basically like FPS with better graphics.

Dan Chiappini: Anytime I get a gun in my hand, it just automatically points at someone's head.

Tony Sarno: Know what? You just better go, dude. Just go, man. Seriously, just go.



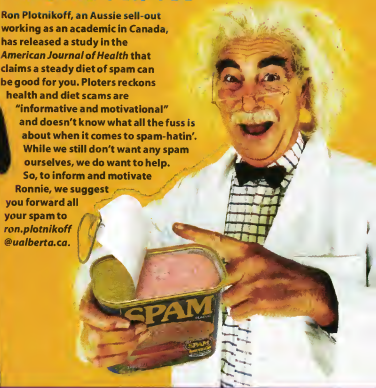
SPAM A SCIENTIST, IT'S GOOD FOR YOU

Ron Plotnikoff, an Aussie sell-out working as an academic in Canada, has released a study in the *American Journal of Health* that claims a steady diet of spam can be good for you. Ploters reckons health and diet scams are

"informative and motivational" and doesn't know what all the fuss is about when it comes to spam-hatin'. While we still don't want any spam ourselves, we do want to help.

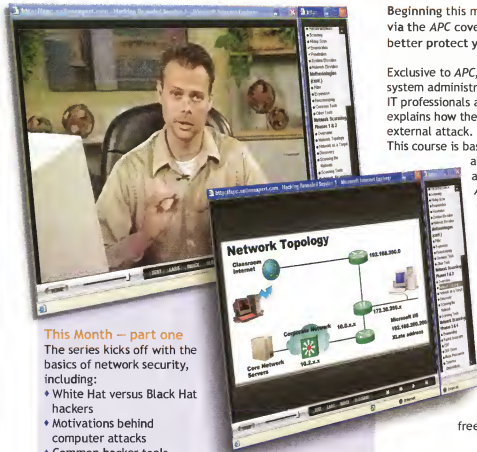
So, to inform and motivate Ronnie, we suggest

you forward all your spam to ron.plotnikoff@ualberta.ca.



Hacking Revealed

Navigating the APC disc special



This Month — part one

The series kicks off with the basics of network security, including:

- White Hat versus Black Hat hackers
- Motivations behind computer attacks
- Common hacker tools
- NMap scans
- Network scanning

Your expert

Guiding you through the Hacking Revealed series is security specialist Dale Brice-Nash, whose expertise includes vulnerability assessment, intrusion detection and incident response handling.

Brice-Nash's consulting clients include Fortune 500 companies and others with enterprise networks of more than 10,000 supported users. Among his IT certifications are Security+, Certified Ethical Hacker, MCSE, MCT, CCNA, Citrix Certified Enterprise Administrator, and Citrix Certified Instructor.

Do I need experience?

Network administration experience and working knowledge of TCP/IP are recommended prerequisites, and current CompTIA Security+ certification and Cisco(r) CCNA certification are helpful.

Don't forget

You need an Internet connection to view your free Hacking Revealed training session on the cover DVD. This is an online course, and the high bandwidth videos and animations load straight from disc. For more information, see the installation instructions on the disc.

Beginning this month, a five-part online series accessed via the APC cover disc that helps you understand how to better protect your networks.

Exclusive to APC, this five-part online training series gives system administrators, network security analysts, and IT professionals a broader understanding of security and explains how they can better protect their networks from external attack.

This course is basic enough for most PC users to follow, but also has enough to interest more advanced IT administrators. Over the next five months, APC brings you onscreen video tutorials giving you a better understanding of how to protect against cracking tools, network scanning, backdoors and password sniffers. Learn about White Hat versus Black Hat hacking, and how reconnaissance works. Discover how to protect wireless networks, routers and switches, and how to defend Windows and Unix systems. Other topics include securing IIS, using Microsoft Baseline Security Analyzer, audits, and security policies.

This LearnKey training series is normally sold by In Learning for \$742.50, but as a special offer, APC readers get the entire series for free, including 15 hours of videos and training.

About In Learning

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- Three PCI-X 133/100/66 MHz slots, one PCI-X 100/66 MHz slot, one PCI-X 66 MHz slot and one 33 MHz PCI slot
- One PCI Express™ x8 slot
- One proprietary SQ-DIMM connector on PCI-X bus, supports U320 SCSI or SATA
- Dual GbE LAN

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- Supports two Intel® Xeon™ Processor with 800 MHz FSB and EM64T
- 8 DIMMs for DDR266/333 memory
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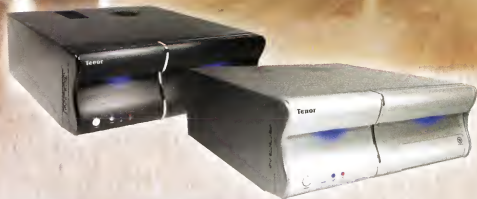
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Front Fan (Intake)

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Dimension	170 x 430 x 460 mm (H*W*D)	
Cooling System	● Front (Intake): 80 x 80 x 25 mm fan, 2000rpm, 19dBA ● Rear (Exhaust): Dual 60 x 60 x 25 mm silent fan, 2500rpm, 19dBA	
Front Accessible Internal	3 x 5.25"2 x 3.5" 3 x 3.5"	
Material	Chassis: 1.0 mm SECC. Front bezel: Aluminum made	
Expansion Slots	7	
Motherboards	ATX, Micro ATX	

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Canon BCI-24C \$7.20

9 Rated 9 out of 10 by PC User

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Model	TONNY	Model	TONNY	Model	TONNY
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T009	\$16.90	T0322/3/4	\$ 9.50	S020097	\$12.90
T013	\$ 5.60	T0422/3/4	\$ 9.50	S020108	\$ 6.50
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T017	\$10.80	T0472/3/4	\$ 8.90	S020187	\$ 5.60
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51645A (#45)	\$26.00	C6657AA (#57)	\$32.00
51649A (#49)	\$30.00	C6658AA (#58)	\$26.00
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LC-02BK	\$21.00	\$9.50			
LC-02C/M/Y	\$11.00	\$8.90			
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LC-47C/M/Y	\$18.50	\$8.90			



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Model	TONNY
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EP-52	\$185.00	\$80.00
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ML-4500D3	\$ 97.00	\$49.00
ML-5200D6	\$163.00	\$65.00
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SF-5100D3	\$ 95.00	\$49.00

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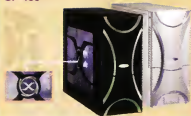
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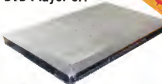
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- Supports voice recording

\$299

CALL NOW! 02 9181 4402

Available while stocks last. Prices may change without notice. Standard retail prices. Prices are GST inclusive. Not available in conjunction with any other offers. Product images are an approximate guide only. All other normal trading conditions apply. Errors and omissions excluded. Prices and product specifications are correct at time of publishing. Credit cards are welcome. Extra charges will apply for postage and handling based on destination. All trademarks, brand names and product names are the property of their respective owners. © Copyright 2005.

YOUR CHOICE YOUR VALUE

NATCOMP

www.natcomp.com.au

EST. 1987

175 VICTORIA STREET DRUMMOYNE NSW 2047

AUGUST 2005


Prices available from 1st to 31st August 2005


\$1,999

Tecra A3 Notebook Bundle

SEE PAGE 3 FOR DETAILS

TOSHIBA



**THREE
GREAT
BONUS
ITEMS!**

- Additional 256MB RAM
- Belkin carry bag
- Harris Technology 3 years extended warranty

SanDisk 

**SANSA e130
MP3 PLAYER**




NEW

PAGE 31

\$145

SONY
VPLDS100 PROJECTOR

PAGE 38



\$1,530



**BONUS
ITEMS
see inside
for details**



Adobe

CREATIVE SUITE 2

PAGE 56

\$1,835

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AUGUST 2005

PRICING

- All purchases are subject to Harris Technology's Terms and Conditions and Returns Policy found at ht.com.au.
- Prices in this catalogue include GST but exclude delivery charges.
- Display accessories shown in photographs throughout this publication are not included in the price.
- All items in this publication have been included in good faith on the basis that the goods will be available at the time of sale. A failure by a supplier to deliver in accordance with sample, description, or at all, may result in some lines being unavailable.
- While every care has been taken to ensure accuracy in this catalogue, we reserve the right to change incorrect prices resulting from a printing or typographical error.
- Harris Technology publishes price changes and any other important corrections regarding this catalogue both on its website ht.com.au, through notices in store and by public notice in The Australian at the earliest opportunity.

ORDERING & DELIVERY

Orders can be collected from one of our locations or delivered, anywhere Australia wide. Delivery times quoted by sales staff are our best estimates based on information received from the manufacturers. Please inquire about all freight charges as they vary for delivery locations and items purchased. The following estimates are offered as a guide only based on off peak state capital metropolitan deliveries.

OFF PEAK

UNDER 3 KG \$13

3 KG - 5 KG \$14

5 KG - 10 KG \$33

OVER 10 KG PLEASE CALL

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Sales Enquiries

1300 13 9999

Fax
Web

1300 13 6666
ht.com.au

August Special Exclusive Notebook Offer

harristechnology



Notebook

MOBILE SOLUTION

EXCLUSIVE SPECIAL OFFER

***DOUBLE** your RAM, **TRIPLE** your warranty and a **BONUS** carry bag!

**THREE
GREAT
BONUS
ITEMS!**

EXCLUSIVE BUNDLE INCLUDES:

- Belkin carry bag
- Additional 256MB RAM (not installed)
- Harris Technology total 3 years extended warranty

L8783 Rent* \$22.40/wk



**TECRA A3
BUNDLE
\$1,999**

NEW

Product images for illustration purposes only

TOSHIBA TECRA A3

Intel Pentium M 730
1.6GHz processor
256MB DDR RAM
40GB* hard drive
15" XGA TFT screen
DVD SuperMulti dual layer drive
56k V.92 modem & Gbit LAN

- Wireless LAN 802.11a/b/g WiFi
- PCMCIA: 1 x Type II
- 5 in 1 Media Reader
- Weight: 2.7kg
- Battery life up to 4 hours
- Microsoft XP Professional
- 1 year warranty

TOSHIBA



Windows XP
Professional



Limited Stock: Offer available only while stocks last

OPTIONAL HARDWARE

DATA PROTECTION BUNDLE

Boost storage and backup with the unique Toshiba 5GB PC Card HDD with Iomega backup software.



\$299

'3' MOBILE WIRELESS BROADBAND NETCONNECT PCMCIA CARD (SELF CONNECT)

Wireless modem that gives you high speed 3G broadband connectivity in 3's Video Zones.



\$599

TOSHIBA ADVANCED PORT REPLICATOR III

For quick & convenient docking in the office. Includes an AC adaptor and powercord.



\$226

TARGUS UNIVERSAL 70W AC POWER ADAPTOR

Leave your current power adaptor at the office and use the Mobile 70 on the road or at home.



\$149

M4983

NORTON INTERNET SECURITY 2005 WITH ANTISPYWARE



NEW
Anti Spyware
Edition. Stops
viruses, hackers
& spyware

\$5481

\$119

PORTABLE BUBBLEJET CANON PIXMA iP90



R8579

\$415

USB KEYS SANDISK MICRO USB 2.0 FLASH DRIVES



P0698 256MB

\$49

P0699 512MB

\$85

S2289 1GB

\$149

SECURITY BUNDLE

Includes Kensington Microsaver cable lock & Defcon security alarm.

P6623

\$99

VERBATIM MEDIA

4.7GB 4x DVD+RW media - 1 pack jewel case

M4722

\$2

4.7GB 8x DVD+R media - 10 disc spindle

P1954

\$9

'RENTSMART

The figures quoted are based on a per week basis over 3 years. Terms and conditions apply.

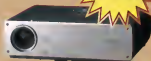
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*Accessible capacity of hard drive may be less due to pre-installed software and recovery partition.

TOSHIBA

NEW LIBRETTO & SATELLITE M60

20th
AnniversaryToshiba
Portable PC
Since 1985TDP-TW90 WIRELESS
PROJECTORBONUS
ITEMS
by redemption

Toshiba's TDP-TW90 Projector is versatile, with all the features and functionality you would expect from a high performance machine. The TDP-TW90 has XGA resolution, 2200 ANSI Lumen and 2000:1 contrast ratio and features an extensive range of terminal inputs; 2 x VGA PC inputs, 1 x VGA out, RCA & S-Video in, Audio in and out. Backed by Toshiba's 3 year warranty. The TDP-TW90 also has built in 802.11b wireless connectivity for up to 4 PCs, and can work in ad hoc or network mode.

Rent* \$37.23/wk
\$3,574

R4045

PROMOTION:

Redeem a bonus table top projection screen and 4-in-1 card reader via Toshiba by emailing your invoice number to isales@toshiba-tap.com. Offer available until 31/08/05.

RENTSMART

The figures quoted are based on a per week basis over 3 years. Terms and conditions apply.

PLEASE NOTE:

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LIBRETTO

NEW
SIZE DOES
MATTER

- Pentium-M 753 1.2GHz ULV
- 7.2" WXGA screen
- 2 x 256MB RAM
- 60GB hard drive*
- WiFi b/g & Bluetooth
- Tiny 210 x 65 x 33mm and 791g
- DVD Dock with DVD SuperMulti
- Microsoft Windows XP Professional

Bluetooth

Wi-Fi

Rent* \$Call/wk

E5927

\$Call

SATELLITE M60

NEW
LIFESTYLE
DESKTOP
REPLACEMENT

- Pentium-M 740 1.7GHz
- 17" WSXGA+ screen
- 512MB DDR II RAM
- 80GB hard drive*
- DVD SuperMulti+DL
- WiFi a/b/g & Bluetooth
- Microsoft Windows XP Professional

Bluetooth

Wi-Fi

Rent* \$37.81/wk

D1016

\$3,630

PORTÉGÉ SERIES

COMPACT AND LIGHT WITH 3 YEAR WARRANTY

Ready to work when and where you are, the Portégé series delivers an advanced combination of ultra-portability and expansion capability. Behind the compact design lies a power base ready to maximise performance with Intel Pentium M processors, large memory, and built-in wireless communication to keep you well connected wherever your business takes you. These functions combine to ensure your investment is well protected.



R200

Ultra light
(1.3kg) and
ruggedised

PORTÉGÉ	R200	M300	M200 TABLET
MOBILE PENTIUM M	753 ULV 1.2GHz	753 ULV 1.2GHz	750 1.8GHz
RAM STD	2 x 256MB	2 x 256MB	512MB
HARD DRIVE	60GB*	60GB*	80GB*
SCREEN	12.1" XGA	12.1" XGA	12.1" SXGA+
56K V.90 & 10/100 LAN	Yes	Yes	Yes
WIRELESS LAN	WiFi b/g	WiFi a/g & BT	WiFi b/g & BT
OPTICAL DRIVE	No	DVD SuperMulti	No
WEIGHT	From 1.3kg	From 1.6kg	2.1kg
OP SYSTEM	XP Pro	XP Pro	XP Tablet
RENT*	\$169.45/wk	\$179.52/wk	\$189.59/wk
PART NUMBER	S1808	S0528	S6940
PRICE	\$3,499	\$3,595	\$4,070

*Accessible capacity of hard drive may be less due to pre-installed software and recovery partition.

TOSHIBA

harristechnology



Notebooks

TECRA A3, A4 & A5 SERIES

TECRA A3

featuring the latest Mobile Intel Pentium M or Intel Celeron M processors and with a standard battery life of up to 4 hours, all models in the series deliver high levels of performance and reliability. Helping to maximise productivity is the full range of expansion and connectivity features including a PC Card slot, three USB 2.0 ports, an international V.92 modem and a 10/100 Mbit Ethernet LAN port.

Optional Port Replicator for the A3 Tecra notebook range available.

BONUS*
RAM, BAG
& PRINTER
(part# 34253)



TECRA	A3 BUNDLE	A3^	A3
PROCESSOR	Cel-M 370 1.5GHz	P-M 730 1.6GHz	P-M 740 1.7GHz
RAM STD	256MB	256MB	512MB
HARD DRIVE	40GB*	40GB*	60GB*
SCREEN	15" XGA TFT	15" XGA TFT	15" XGA TFT
OPTICAL DRIVE	DVD/CD-RW	DVD SuperMulti +DL	DVD SuperMulti
LAN	10/100	Gbit	10/100
WIRELESS LAN	WiFi Antenna	WiFi a/b/g	WiFi a/b/g
WARRANTY	1 year	1 year	1 year
OP SYSTEM	XP Pro	XP Pro	XP Pro
RENT*	\$24.29/wk	\$24.29/wk	\$24.29/wk
PART NUMBER	34253	L6106	34259

PRICE **\$1,595** **\$2,035** **\$2,365**

REFER TO PAGE 3 FOR AN EXCLUSIVE SPECIAL OFFER ON THIS MODEL

TECRA A4 & A5

For business professionals the perennial question remains "your business or your life"? Why not enjoy both with the Tecra A4 & A5 Notebook PC series from Toshiba. You'll work smarter and faster than ever before with its stunning array of performance features. Then enjoy its reliable mobility to see less of the office and more of your family and friends. And all at a price that helps balance the books as well. Includes Centrino mobile technology.

NEW
TECRA
A5



TECRA	A4	A5
MOBILE PENTIUM M	740 1.7GHz	740 1.7GHz
RAM DDR	512MB	512MB
HARD DRIVE	60GB*	60GB*
SCREEN	15.4" WXGA (CSV)	14" WXGA
VIDEO RAM	Shared	Shared
OPTICAL DRIVE	DVD SuperMulti +DL	DVD SuperMulti +DL
WIRELESS LAN	WiFi a/b/g	WiFi a/b/g & BT
WARRANTY	1 year	1 year
OP SYSTEM	XP Pro	XP Pro
RENT*	\$24.29/wk	\$24.29/wk
PART NUMBER	34260	C9268

PRICE **\$2,475** **\$2,365**

*Accessibility capacity of hard drive may be less due to pre-installed software and recovery partition.

TDP-SW25 WIRELESS PROJECTOR

BONUS
ITEMS
by redemption
See page 4



Toshiba's TDP-SW25 Projector features an integrated WLAN function plus all necessary software for wireless presentation. With excellent picture quality in video and data mode, 1800 ANSI Lumens projector is the perfect solution for presentations.

- Brightness: 1,800 ANSI-lumens
- Contrast Ratio: 2,000:1
- Resolution: SVGA 800 x 600
- Wireless communication: WiFi 802.11 b/g
- 3 year warranty & 90 day new product replacement warranty

Rent* \$24.29/wk

S3216 **\$2,274**

*Bonus offer only available while stocks last. Not available in conjunction with any other offer.

*RENTSMART

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TOSHIBA

TECRA M3 & S2 SERIES

20th
AnniversaryToshiba
Portable PC
Since 1985TECRA M4
TABLET PC

The M4 is a versatile and convertible Notebook for business professionals who won't compromise on the consistency, reliability and longevity of their business machines. Now executives can create data and browse information using natural pen-based input, saving precious time and protecting valuable intellectual property.

- Intel Pentium M 770 2.1GHz
- 2 x 512MB DDRII RAM
- 80GB* (5400 rpm) HDD
- 14.1" SXGA+ TFT (1400 x 1050)
- nVidia GeForce 6200 Go with 128MB Video RAM
- DVD SuperMulti +DL Drive
- 56K modem & Gigabit LAN
- WiFi a/b/g
- Weighs 2.8kg
- Microsoft OneNote and Windows XP Tablet Edition

Rent* \$45.68/wk

S2872

\$4,950

*RENTSMART

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TECRA M3

The Tecra M3 delivers a balance of portability, hardware and software image stability with high performance. The magnesium alloy chassis provides added durability whilst making it the lightest in its class. Combined with extended battery life (with optional high capacity and internal SelectBay battery), this makes the Tecra M3 the ideal road ready business notebook. Featuring Intel Pentium M Processors, a choice of DVD/CD-RW or DVD SuperMulti optical disk drive, Gigabit Ethernet, Firewire and Bluetooth options. The M3 provides a foundation to significantly boost business productivity.



MODEL	TECRA M3	TECRA M3	TECRA M3	TECRA M3
MOBILE PENTIUM M	730 1.6GHz	740 1.7GHz	750 1.8GHz	760 2GHz
RAM STD (DDR II)	512MB	512MB	512MB	2 x 512MB
HARD DRIVE	40GB*	60GB*	60GB*	80GB*
SCREEN	14" XGA TFT	14" XGA TFT	14" XGA TFT	14" SXGA+ TFT
VIDEO RAM	64MB	64MB	128MB	128MB
OPTICAL DRIVE	DVD/CD-RW	DVD SuperMulti	DVD SuperMulti	DVD SuperMulti
WIRELESS LAN	Upgradeable	WiFi a/b/g	WiFi a/b/g	WiFi a/b/g
WARRANTY	3 year	3 year	3 year	3 year
OP SYSTEM	XP Pro	XP Pro	XP Pro	XP Pro
RENT*	\$45.68/wk	\$45.68/wk	\$45.68/wk	\$45.68/wk
PART NUMBER	R3721	R3722	R3723	R3724
PRICE	\$2,695	\$3,079	\$3,395	\$4,099

TECRA S2

The Toshiba Tecra S2 delivers outstanding performance and seamless wireless connectivity to business computing. Now free to perform at their best wherever business takes them, executives will appreciate the added mobile productivity of the Tecra S2 with up to 4.5 hours of battery life. Includes modem and LAN capabilities.



MODEL	TECRA S2	TECRA S2	TECRA S2
MOBILE PENTIUM M	750 1.8GHz	760 2GHz	770 2.1GHz
RAM STD	512MB	512MB	512MB
HARD DRIVE	60GB*	80GB*	100GB*
SCREEN	15" XGA TFT	15" SXGA+ TFT	15" UXGA TFT
VIDEO RAM	64MB	128MB	128MB
OPTICAL DRIVE	DVD SuperMulti +DL	DVD SuperMulti +DL	DVD SuperMulti +DL
WIRELESS LAN	WiFi a/b/g, BT antenna	WiFi a/b/g, BT	WiFi a/b/g, BT
WARRANTY	3 year	3 year	3 year
OP SYSTEM	XP Pro	XP Pro	XP Pro
RENT*	\$45.68/wk	\$45.68/wk	\$45.68/wk
PART NUMBER	F9587	H1034	C9269
PRICE	\$2,915	\$3,630	\$4,620

*Accessible capacity of hard drive may be less due to pre-installed software and recovery partition.

VAIO NOTEBOOKS

STUDY & BUSINESS

XP Professional included

VGNB77GP
Pentium M 735
1.7GHz
512MB RAM
40GB HDD*
DVD/CD-RW Combo Drive
Wireless LAN 802.11b/g
14.1" XGA Display
Weights only 2.3kg
Windows XP Professional

Centrino
MOBILE TECHNOLOGY

Rent* \$22.40/wk

S1263 **\$1,699**

Dual Layer Drive Weighs 2.3kg

VGNB99GP
Pentium M 725 1.6GHz
512MB RAM
40GB HDD*
DVD±RW dual layer drive
Wireless LAN 802.11b/g
14.1" SXGA+ display
Weights 2.3kg
Windows XP Professional

DVD±RW
MOBILE TECHNOLOGY

Rent* \$24.56/wk

R0602 **\$1,999**

ULTRA PORTABLE

GNS48GPB
Pentium M 760 2GHz
512MB RAM
60GB HDD*
DVD±RW dual layer drive
13.3" WXGA Clear Bright LCD
Wireless LAN 802.11b/g
Integrated Bluetooth
Windows XP Professional

DVD±RW
MOBILE TECHNOLOGY

Rent* \$36.45/wk

34275 **\$3,499**

Up to 8.5 hrs Battery Life

VGNT37GPGS
Pentium M 753 1.2GHz
1GB RAM
60GB HDD*
DVD±RW dual layer drive
Wireless LAN 802.11b/g
10.6" WXGA with Clear Bright
Integrated Bluetooth
Weights only 1.38kg
Windows XP Professional

DVD±RW
MOBILE TECHNOLOGY

Rent* \$38.53/wk

S1262 **\$3,699**

WIDE SCREEN, FAST & SLIM

NEW!

VGNFS25GP
Pentium M 735 1.7GHz
512MB RAM
60GB HDD*
DVD±RW dual layer drive
15.4" WXGA with clear bright LCD
Wireless LAN 802.11b/g
Windows XP Professional

DVD±RW
MOBILE TECHNOLOGY

Rent* \$26.70/wk

E0408 **\$2,499**

VGNFS28GP
Pentium M 760 2GHz
512MB RAM
80GB HDD*
DVD±RW dual layer drive
Wireless LAN 802.11b/g
15.4" WXGA with clear bright dual lamps LCD
Windows XP Professional

DVD±RW
MOBILE TECHNOLOGY

Rent* \$31.55/wk

S7130 **\$2,999**

*Accessable capacity of hard drive may be less due to pre-installed software and recovery partition.

SONY NOTEBOOKS

All notebooks have a Memory Stick Pro slot and are bundled with a full suite of multimedia software including Adobe Premiere Pro Standard and Photoshop Elements.

VAIO ACCESSORIES

WIRELESS KEYBOARD WITH TOUCHPAD & OPTICAL MOUSE



S7004 **\$249**

WIRELESS OPTICAL MOUSE



P0743 **\$89**

USB VISUAL COMMUNICATION CAMERA



P2928 **\$179**

PORT REPLICATOR FOR FS SERIES

R7035 **\$269**

PORT REPLICATOR FOR S SERIES

R7230 **\$359**

PORT REPLICATOR FOR T SERIES

Q4970 **\$399**

*RENTSMART

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ACER NOTEBOOKS

TRAVELMATE
4102WLMi
WITH WIDESCREEN

Work with freedom and experience a brand new approach to productivity! The new TravelMate 4100 combines Intel Centrino technology featuring PCI Express, with a comprehensive feature set to offer one of the most practical notebooks available today.

- Intel Pentium M 740 1.7GHz
- 512MB DDR2 RAM
- 15.4" CrystalBrite widescreen
- 60GB Hard Disk*
- DVD±RW Dual Layer Drive
- 3 x USB 2.0 Ports
- 56Kbps Modem
- 10/100 LAN
- WiFi 802.11b/g
- Windows XP Professional



Rent* \$24.56/wk

E0070

\$2,299***RENTSMART**

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TRAVELMATE 2355LCi

The TravelMate 2355 is the perfect partner for enhancing your efficiency and success with its combination of robust processing power, graphics capabilities, communications and dependable design.

- Intel Celeron M 360 1.4GHz
- 256MB RAM
- 15" XGA Screen
- 40GB Hard Disk*
- DVD/CD-RW Combo Drive
- 3 x USB 2.0 Ports
- Modem / LAN
- WiFi 802.11g with SignalUp Technology
- Windows XP Professional



Rent* \$13.43/wk

S4173

\$1,199

TRAVELMATE 4152LMi

The professionally balanced TravelMate 4152 is well designed to optimise your productivity and amplify success, combining solid processing and graphics capabilities, with wide ranging functionality.

- Intel Pentium M 740 1.7GHz
- 512MB DDR2 RAM
- 15" XGA Screen
- 80GB Hard Disk*
- DVD±RW Dual Layer Drive
- 3 x USB 2.0, Firewire, S-Video Out
- Modem / LAN
- WiFi 802.11g with SignalUp Technology
- Up to 5.5 hours of battery life
- Windows XP Professional



Rent* \$22.40/wk

90189

\$1,999BOOST YOUR WIRELESS CONNECTION
WITH ACER SIGNALUP

A breakthrough that boosts wireless performance by a minimum of 25%. Acer technology provides a more stable signal with higher quality wireless both outdoors and in difficult indoor environments.

*Accessible capacity of hard drive may be less due to pre-installed software and recovery partition.

acer

harristtechnology 

Desktops

HIGH PERFORMANCE COMPUTING AT AN AFFORDABLE PRICE

ACER POWER F1 CELERON PC

Intel Celeron 2.8GHz
(256KB L2 cache, 533Mhz FSB)
256MB PC3200 DDR SDRAM
40GB* hard drive (7200 RPM)
52x write, 24x rewrite 52x read CDRW
Keyboard and mouse
Microsoft Windows XP Professional
17" LCD monitor
1 year onsite manufacturer desktop warranty*



Images for illustration purposes only.

Rent* \$12.31/wk

\$1,099

ACER POWER F1 PENTIUM 4 PC

Intel® Pentium 4 3.0GHz processor
(1MB L2 cache, 800MHz FSB)
512MB PC3200 DDR SDRAM
80GB* hard drive (7200 RPM)
DVD/CDRW combo drive
Keyboard and mouse
Microsoft Windows XP Professional
17" LCD monitor
1 year onsite manufacturer desktop warranty*



Images for illustration purposes only.

Rent* \$15.68/wk

\$1,399

ACER 19" LCD MONITOR



- Response time: 20ms
- Maximum resolution:
1280 x 1024 @ 75Hz
- Brightness: 300cd/m²
- Contrast: 800:1
- Pixel Pitch: 0.294mm
- Analog Input

KEY PRODUCT FEATURES

- Tilt base
- High brightness & contrast ratio
- True colour supported
- Large viewable area
- Auto scaling function

Rent* \$6.26/wk

R9022

\$559

*RENTSMART

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PLEASE NOTE:

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*Onsite warranty coverage is limited to within a 80km radius of an Acer Onsite Service Provider location.

*Accessible capacity of hard drive may be less due to pre-installed software and recovery partition.

acer.ht.com.au

TRULY MOBILE BROADBAND

CONTRACT OPTIONS

Every plan has three contract options - the longer the contract, the lower the activation charge

ACTIVATION CHARGES

No Contract	\$129
6 Month Contract	\$99
12 Month Contract	\$66

Please remember to confirm that you are in an iBurst coverage area.

LAPTOP PLANS

Speed*	Data**	Price#
• 512/128k	300MB	\$49.95
• 1Mb/345k	500MB	\$64.95
• 1Mb/345k	1GB	\$99.95
• 1Mb/345k	3GB	\$129.00
• 1Mb/345k	10GB	\$199.95

DESKTOP PLANS

Speed*	Data**	Price#
• 256/64k	200MB	\$29.95
• 256/64k	400MB	\$34.95
• 512/128k	400MB	\$44.95
• 512/128k	1GB	\$59.95
• 1Mb/345k	1GB	\$64.95
• 1Mb/345k	3GB	\$79.95
• 1Mb/345k	10GB	\$189.95



* Actual Speed may vary depending on a number of factors including but not limited to coverage areas.

** Download amounts are monthly included amounts on reaching the limit, connection will be shaped to 64Kbps. Option available to pay 12c incl GST per excess MB downloads.

Price is a monthly charge and is inclusive of GST.

PLEASE NOTE:

All purchases subject to terms & conditions and returns policy. Delivery charges may apply. Not all items stocked in store but available for pick-up/delivery.

Chilli iBurst

It's as mobile as your mobile



WHAT IS CHILLI iBURST MOBILE BROADBAND?

CHILLI iBURST IS A BROADBAND INTERNET SERVICE THAT IS AS MOBILE AS YOUR MOBILE PHONE. More than wireless you can:

- Freely move your broadband connection between rooms, buildings, cities and even while on the move
- Get online, first time in less than 10 minutes
- Liberate yourself from \$30+ a month phone line rentals

For more information on Chilli iBurst including a video demonstration of the product please go to www.chilli.net.au

HOW DO I CONFIRM MY AREA IS COVERED?

Chilli iBurst is currently available in Sydney, Melbourne, Brisbane, Canberra and the Gold Coast with coverage expanding every week. To check whether your specific area has coverage please go to <http://iBurstCoverage.chilli.net.au> or call Chilli on 1300 655 554.

NB: This service not yet available in WA.

EVERY CHILLI iBURST PACKAGE COMES WITH:

- Full 30 day money back guarantee & 12 month warranty on hardware
- 3 email addresses
- 5MB of personal web space

CHILLI iBURST DESKTOP MODEM (HARDWARE ONLY)



PLANS FROM \$29.95 per month

CHILLI iBURST LAPTOP MODEM (HARDWARE ONLY)



PLANS FROM \$49.95 per month

The Chilli iBurst desktop modem is similar in size to a traditional ADSL modem. It has a connection to mains power, a small aerial and ports allowing connectivity through Ethernet or USB. It can be used on any desktop or laptop computer, doesn't need a router but can be networked to provide broadband access to multiple computers. The modem is portable and can be unplugged from mains, moved to a new location within the metrowide coverage area and powered up again.

Mobile broadband connectivity is delivered through the Chilli iBurst PCMCIA card (aka Laptop Modem). When connected to a mobile device such as a laptop it provides seamless connectivity within the iBurst coverage area. A secure connection can be maintained at up to 100 km/h which means that whether you're in a car, train, bus or ferry you can stay connected with Chilli iBurst.

S0248

\$199

S0247

\$299

FOR BUSINESSES ON THE MOVE

THE HANDHELD THAT'S ALSO A DRIVE.

TUNGSTEN[™] T5



ALMONE TUNGSTEN T5

Quick facts:
 256MB¹ of storage
 Transfer files and folders back and forth to your desktop
 Use like a flash drive with another computer²
 Stunning 320 x 480 display, landscape or portrait mode
 Create and edit Word and Excel documents, plus view PowerPoint files
 View photos, videos³ and play MP3s
 Built-in Bluetooth wireless technology
 Powerful Intel 416MHz XScale processor
 Palm OS 5.4

**BONUS
BUNDLE⁺
CRADLE KIT
& LEATHER
CASE**



Rent* \$6.49/wk

Q9808 **\$529**

S5371 INCLUDES SD WIFI CARD **\$579**

AFFORDABLE AND PACKED WITH PRODUCTIVITY
OR WHEREVER BUSINESS TAKES YOU

TUNGSTEN[™] E2

With a brighter, richer colour screen, it brings your calendar, contacts, documents and presentations, photos and videos³ to life. Plus, flash memory keeps information safe if you don't have time to recharge.

26MB of flash storage
 Display your data on a brighter
 320 x 320 colour display
 Increased battery life
 View photos, videos³ and play MP3s⁴
 Built-in Bluetooth wireless technology
 Create and edit Word and Excel documents, view PowerPoint files
 Intel 200MHz XScale processor
 with Palm OS 5.4



Some files may require conversion
 Requires expansion card, sold separately

GSM/GPRS QUAD-BAND SMARTPHONE

Treo 650

The Treo 650 smartphone simplifies your life by combining a compact mobile phone with email, an organiser, messaging and web access. Not to mention an MP3 player⁴, a digital camera that captures video and a vibrant colour screen that brings everything to life.

- Full featured mobile phone and Palm Powered organiser
- 22MB user accessible memory; SDIO/MMC
- Bright colour backlit 320 x 320 display
- Built-in Bluetooth wireless technology
- Built-in VGA camera
- Palm OS 5.4; weight 178g



**BONUS
BLUETOOTH
HEADSET⁴**

⁴ Requires expansion card, sold separately



Rent* \$11.19/wk

R9437 **\$399**

R3503 **\$999**

*Receive a bonus cradle kit & leather case bundle. Valid until 31/08/05 or while stocks last. Not available in conjunction with any other offer. ⁴Cashback & bonus headset via palmOne redemption. See www.palmone.com/au/products/promotions/treo650headset for details.

REVOLUTIONISE THE WAY
YOU MANAGE YOUR LIFE WITH
LIFEDRIVE

LifeDrive™



palmOne introduces the all new LifeDrive mobile manager. With **3.8GB of storage and built in WiFi & Bluetooth support**, you can easily carry files from your desktop computer, 300 songs, 2.5 hours of video³, vacation photos, and more. Includes support for POP, IMAP and Exchange email accounts, plus onboard video recorder, MP3 player, and photo viewer.

- 4GB hard drive (3.85GB user accessible)
- LifeDrive smart file management
- WiFi (802.11b) and Bluetooth v1.1
- 320 x 480 hi-resolution, colour display
- Supports native Word, Excel, and PowerPoint files
- Supports secure wireless email access with attachments
- Built-in Microsoft Exchange ActiveSync⁴
- Camera companion software
- MP3 player
- Intel 416MHz XScale processor

⁴Requires Microsoft Exchange Server 2003

Rent* \$10.07/wk

S1814 **\$899**

³ Some files may require conversion

*RENTSMART

The figures quoted are based on a per week basis over 3 years. Terms and conditions apply.

PLEASE NOTE:

All purchases subject to terms & conditions and returns policy. Delivery charges may apply. Not all items stocked in store but available for pick-up/delivery.

HP COMPAQ NOTEBOOKS & POCKET PC

HP iPAQ hw6500
MOBILE MESSENGER

NEW

Taking global communication
to new places

The sleek HP iPAQ hw6500 Mobile Messenger is a global communications device giving you the best in connectivity, productivity, and mobility with high end features such as support for GSM/GPRS networks, GPS Navigation and multiple messaging capabilities.

- Intel XScale 312MHz processor
- Integrated quad band GSM/GPRS Phone & GPS
- Integrated 1.3MP camera
- 64MB RAM, with 12MB iPAQ File Store
- 3" Transflective TFT colour with LED backlight
- Integrated SD and mini SD slot
- MP3 playback through stereo headphone jack
- Size: 118mm x 71mm x 21mm
- Weight: 165g
- Microsoft Windows Mobile 2003 SE for Pocket PC – Phone Edition



Rent* \$13.43/wk

C5205

\$1,199

† TERMS & CONDITIONS:

Offer available from 01/08/05 to 31/08/05. Via redemption from hp web site www.hp.com.au/notebookpromo. Not available in conjunction with any other offer.

*RENTSMART

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HP COMPAQ nx6120 SERIES

PACKED TO PERFORM, PRICED TO PLEASE

The HP Compaq nx6120 Business Notebook is packed with advanced technology features offering solid performance at a surprisingly affordable price. What's more, most models come with wireless connectivity so that you can get the job done effortlessly, wherever your work takes you.



BONUS
Double Memory
& Carry Case*



MODEL	nx6120 [†]	nx6120 [†]	nx6120 [†]	nx6120 [†]	nx6120 [†]
PROCESSOR	Cel-M 360	Cel-M 360	P-M 730	P-M 730	P-M 740
CLOCK SPEED	1.4GHz	1.4GHz	1.6GHz	1.6GHz	1.7GHz
RAM	256MB	256MB	512MB	512MB	512MB
HARD DRIVE	40GB#	40GB#	40GB#	60GB#	80GB#
SCREEN	15" XGA	15" XGA	15" XGA	15" XGA	15" SXGA+
OPTICAL DRIVE	Combo	DVD±RW	DVD±RW	DVD±RW	DVD±RW
WIRELESS LAN		802.11g	802.11g	802.11g+BT	802.11g+BT
WARRANTY	1 year	1 year	1 year	1 year	1 year
RENT*	\$14.51/wk	\$17.87/wk	\$21.24/wk	\$23.48/wk	\$25.58/wk
PART NUMBER	R7182	R7183	R7184	R7185	R7186
PRICE	\$1,295	\$1,595	\$1,895	\$2,095	\$2,395

HP COMPAQ nx8220 SERIES

HIGH-END PERFORMANCE IN A THIN AND LIGHT
WIDESCREEN DESIGN

The HP Compaq 8200 series Notebook PCs combines the processing and graphics power of a desktop with the mobility and convenience of a notebook. It offers users high performance processing and graphics capabilities in a travel friendly, thin and wide form factor. Mobile professionals will like the thin, sleek design combined with the advantages of a 15.4" widescreen display and desktop equivalent performance.



BONUS
Double Memory
& Carry Case*
(on selected models)



MODEL	nx8220 [†]	nx8220 [†]	nx8220 [†]
PROCESSOR	P-M 740	P-M 750	P-M 770
CLOCK SPEED	1.7GHz	1.8GHz	2.1GHz
RAM	512MB	512MB	1GB
HARD DRIVE	60GB#	80GB#	80GB#
SCREEN	15.4" WXGA	15.4" WSXGA+	15.4" WSXGA+
OPTICAL DRIVE	DVD±RW	DVD±RW	DVD±RW
WIRELESS LAN	802.11a/b/g+BT	802.11a/b/g+BT	802.11a/b/g+BT
WARRANTY	1 year	1 year	1 year
RENT*	\$26.65/wk	\$31.51/wk	\$40.78/wk
PART NUMBER	R9130	R9131	R9135
PRICE	\$2,495	\$2,995	\$3,995

*Accessible capacity of hard drive may be less due to pre-installed software and recovery partition.



harris technology



Desktops

HP DESKTOPS

HP DX5150 MT & MICROSOFT OFFICE BASIC BUNDLE

Athlon 64 3000+ processor
512MB RAM (2 X 256MB)
80GB SATA HDD (7200RPM)*
16x DVD +/-RW drive
56K modem
Keyboard & mouse included
Windows XP Professional

Microsoft Office Basic includes:
• Word 2003
• Excel 2003
• Outlook 2003

**BONUS
MICROSOFT
OFFICE BASIC**



Image for illustration purposes only.

HP DX5150 MICRO TOWER PC & MICROSOFT OFFICE BASIC EDITION

Rent* \$14.56/wk

L9363

\$1,299

HP DX2000 MT & HP 15" OR 17" LCD MONITOR

Intel Celeron D 330 2.66GHz processor
256MB DDR SDRAM PC3200
40GB HDD (5600RPM)*
48x/32x/48x CD-RW Drive
8 USB 2.0 ports
Keyboard & mouse included
Windows XP Professional



Image for illustration purposes only.

HP DX2000 MICROTOWER DESKTOP PC & HP L1502 15" LCD MONITOR

Rent* \$10.63/wk

S7341

\$949

HP DX2000 MICROTOWER DESKTOP PC & HP L1702 17" LCD MONITOR

Rent* \$11.75/wk

F7727

\$1,049

*Accessible capacity of hard drive may be less due to pre-installed software and recovery partition.

DC7600 SFF



Image for illustration purposes only.

AF949PA

- Intel P4 3.0GHz processor
- 512MB PC4200 RAM
- 80GB SATA HDD (7200RPM)*
- CD-ROM
- Windows XP Professional

Rent* \$14.22/wk

S7327

\$1,269

AF950PA

- Intel P4 3.0GHz processor
- 512MB PC4200 RAM
- 80GB SATA HDD (7200RPM)*
- CD-RW/DVD combo drive
- Windows XP Professional

Rent* \$14.78/wk

S7140

\$1,319

RENTSMART

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HP ProLiant ML110G2

OPTIONS FOR HP PROLIANT ML110G2

MEMORY OPTIONS

1024MB of Advanced ECC
PC3200 DDR SDRAM DIMM
Memory Kit (1 x 1024MB)

Rent* \$10.53/wk

Q3070 **\$940**

512MB of Advanced ECC PC3200
DDR SDRAM DIMM Memory Kit
(1 x 512MB)

N1788 **\$410**

OPTICAL DRIVE OPTIONS

CD-RW/DVD-ROM Combo Drive
Option Kit

K7926 **\$205**

1.44MB Floppy Drive Option Kit

S2368 **\$80**

HARD DRIVE OPTIONS

hp ProLiant Hot-Pluggable 160GB
SATA 7200 RPM Drive

P8018 **\$355**

hp ProLiant Hot-Pluggable 250GB
SATA 7200 RPM Drive

Rent* \$7.28/wk

Q3483 **\$650**

WARRANTY OPTIONS

3 Years Next Day On-Site Warranty
Upgrade

M6877 **\$390**

3 Years 4 Hour On-Site Warranty
Upgrade

M6879 **\$1,211**

*RENTSMART

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week basis over 3 years. Terms and
conditions apply.

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available for pick-up/delivery.

HP ProLiant ML110G2

P4 3.0GHz 1GB 2X80GB SATA HOT-SWAP SBS

All small businesses want to focus on improving their business rather than simply running it. If that's you, then you are ready for an HP ProLiant server. By employing the right server solution for your size of business, you can easily share documents, internet, databases, software applications, printers and communicate via email. HP ProLiant servers provide easy to use technology that increases productivity, saves your business money, minimises business risk, and lets you reclaim your leisure time for those more important things in life. And as the chosen partner of Microsoft®, ProLiant servers come pre-loaded with Microsoft® Small Business Server 2003, making them the ideal 'out of the box' solution for any office.

PRODUCT FEATURES:

- Intel® Pentium® 4 Processor 3.0GHz standard (supporting Hyper-Threading Technology). Multi Processor not supported
- 1GB PC3200 DDR SDRAM running at 400MHz, with unbuffered standard ECC capabilities (4GB maximum)
- Integrated 1024-KB Level 2 ECC cache
- Intel® E7221 Chipset
- 2x80GB 7,200 RPM SATA Hot Plug Drives, 4 free hotplug slots
- 48x IDE (ATAPI) CD-ROM Drive
- Intel® 82541PI PCI Gigabit NIC (embedded) 10/100/1000 WOL (Wake on LAN)
- Windows Small Business Server - Standard Edition with 5 CALs (pre-installed OEM version)
- 1 x Parallel, 1 x Serial, 1 x Pointing Device (Mouse), 1 x Graphics, 1 x Keyboard, 1 x Network RJ-45, 5 x USB Ports (2 Rear, 2 Front Panel, 1 Internal for memory stick)
- **Warranty:** 1 Year Limited Warranty (1 Year Parts/ 1 Year Labour/ 1 Year On-Site)



Windows
Small Business Server 2003



WINDOWS SMALL BUSINESS SERVER STANDARD EDITION COMES WITH:

- Windows Server 2003
- Exchange Server 2003
- Windows SharePoint Services
- Microsoft Shared Fax Service
- 5 client access licences, including Microsoft Outlook 2003 Client

Windows Small Business Server 2003 delivers a powerful advantage to small businesses owners. A complete and affordable network solution, it brings the power of big business technology to small companies. By simplifying your business operations and allowing you to make the most of your resources, Windows Small Business Server 2003 helps your company work smarter and more productively.

Rent* \$19.04/wk

R8141

\$1,699

GET MOBILE...GET TARGUS

GLOBAL EXECUTIVE CASE RANGE



BACKPACK CASE DELUXE CASE UNIVERSAL CASE

All cases have a top loading compartment that fits notebooks with up to 15.4" screens. A padded interior compartment, coupled with the patented SafePORT Air Cushion System and the Dome Protection System ensures superior protection. Each case unites original specialty items such as a hidden water bottle holder and retractable blue light with amenities including a removable CD/DVD sleeve and accessory pouch. The lightweight and rugged design made with scratch resistant lining and water resistant fabric make them ideal for executives requiring comfort, functionality and protection. The Deluxe Case has an extra zippered file section while the Universal also includes a compartment for a projector.

E1182	BACKPACK	\$139	E0407	CASE	\$99
C9272	DELUXE CASE	\$139	D8249	UNIVERSAL CASE	\$165

MOUSE

ULTRA MINI 5 BUTTON OPTICAL MOUSE



WORLD'S SMALLEST 5 BUTTON OPTICAL MOUSE

Ideal for travel, this compact optical mouse with USB retractable cable is the world's smallest 5 button mouse!

40655 **\$35**

WIRED MINI MOUSE AMU02US



NEW!

Ideal for travel and desktop use, this ergonomic optical mouse with USB retractable cable has a 3 button scroller wheel design suitable for left and right hand users.

C9388 **\$35**

WIRELESS OPTICAL MOUSE



NEW!

RF wireless technology provides a clean, uncluttered workspace with optical design technology and on/off switch to preserve battery life. Suitable for PC and Apple users.

C9431 **\$65**

POWER

UNIVERSAL 70 WATT AC POWER ADAPTOR



Leave your current power adaptor at the office and use the Mobile 70 watt on the road or at home.

N5645 **\$149**

UNIVERSAL 70 WATT AC POWER ADAPTOR



Power your mobile devices wherever you go, in your car, on an aeroplane, boat or 4WD.

N2037 **\$155**

UNIVERSAL 70 WATT AC POWER ADAPTOR



Capable of AC or DC Power Input Works at home, office, car, boat, or aeroplane.

N2257 **\$199**

VALUE BUNDLE



NOTEPAD SURGE GUARD
USB HUB
S5218 **\$165**

MOBILE OFFICE BUNDLE



PRESENTER
NOTEPAD
STAND
S2607 **\$189**

CORPORATE BUNDLE



COMBINATION LOCK
NOTEPAD
MINI MOUSE
A5089 **\$199**

PLEASE NOTE:

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BELKIN

®

BELKIN ACCESSORIES

BELKIN
WIRELESS
RECHARGEABLE
MOUSE

NEW!

You can use your mouse from up to six feet from the base. Efficient, USB plug-and-play operation makes it easy to install, and advanced digital technology ensures optimum performance.

F8E845AU

- Offers a quick recharge between long operation cycles
- Delivers superior optical quality without wires
- Ergonomic design offers left- or right-handed use
- Includes 3 one-touch hot keys
- Includes long-lasting NiMH rechargeable batteries

S2567

\$53

PLEASE NOTE:

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BELKIN USB 2.0 HI SPEED DRIVE ENCLOSURE



F5U209AU

- Adds additional storage space to your computer
- Changes your internal hard drive or CD/DVD RW into a portable drive
- Ideal for loading large files or transferring data between computers
- Supports a maximum drive size of up to 250GB

R1646

\$89

BELKIN USB 2.0 7 PORT HUB



F5U237AU

- 2 top loading ports for Bluetooth or Flash Drive access
- Stackable design allows 2 hubs on top of each other
- Slimline, functional look with plug-and-play usability
- Lowers power consumption for longer battery life

M3000

\$59

BELKIN USB 2.0 DOCKSTATION



F5U216AU

- Connects all your peripheral devices to one hub using only 2 cables
- Provides two USB 2.0 ports, one parallel port, one 10Base-T/100Base-T Ethernet port, one VGA pass-through port for monitor connection, and one RS232 serial port
- Leave all devices attached when you leave the office, return and only plug in 2 cables!
- Saves space on your desktop, provides easy to reach port access

M2749

\$99

BELKIN USB 2.0 3 PORT PCI CARD
(2 EXTERNAL + 1 INTERNAL)

F5U219

- Adds USB 2.0 capability directly to your computer
- Includes driver installation CD and user manual
- Installs easily into a free PCI slot
- Comes with Belkin's Lifetime Warranty and free technical support
- Provides two easily accessible 480Mbps USB 2.0 ports

H2242

F5U219 3-Port PCI Card

\$29

C7546

F5U220 5-Port PCI Card

\$45

BELKIN MINI USB GLO MOUSE
WITH RETRACTABLE CORD

F8E836

- Features a retractable cord for tangle-free storage
- Radiates attractive colour-changing band of light and scroll wheel
- Flexible, left or right-handed comfort
- Provides optical precision at 800dpi
- Covered by Lifetime Warranty

R9475

\$33

CLASSIC KEYBOARD BLACK USB ONLY



F8E206

- "Quiet-Type" soft key technology
- One-touch access with hot keys
- Menu "Start" and pull-down hot keys
- USB port connection
- Covered by Lifetime Warranty

Q7609

\$14

BELKIN®

harristechnology



Accessories

BELKIN ACCESSORIES

ECONOMY 2 PORT KVM WITH CABLES ATTACHED, M, USB & AUDIO SUPPORT



F1DL102U
 Offers a complete compact solution with audio support and built-in cables
 Features a manual port selector and LED indicators
 Video resolutions up to 2048 x 1536
 Supports multiple operating systems
 Requires no power supply

N8931

\$85

BELKIN SOHO 2 PORT DUAL-HEAD (VGA) KVM SWITCH WITH 2 ADDITIONAL SWITCHING USB PORTS



F1DH102UAV
 Supports Dual-Head VGA computers
 Switches through USB hot keys and direct-access port selectors
 Offers speaker and microphone support
 Flash-upgrades firmware easily
 10 second auto-scan mode

S3954

\$275

HOME SERIES SURGE CUBE + \$40,000 WARRANTY



F9H100VAUCW
 • Single outlet Surge cube for total protection of one unit
 • Comes with \$40,000 connected equipment warranty for total protection of your valuables
 • Provides greater spike and lightning absorption with 25000Amps maximum spike current rating

N3355

\$25

ECONOMY 4 PORT SWITCH - PS/2 ONLY, ALL CABLES INCLUDED, 1.8M



F1DB104P
 • Supports video resolutions up to 2048 x 1536 @ 85Hz through a 400MHz bandwidth
 • Features hot key switching and manual push-button port selection
 • 10 second auto-scan function
 • 2 year warranty and technical support

D3159

\$149

SUPERIOR SERIES 6-WAY (2M CORD) + TEL + \$150,000 WARRANTY



F9S623AU2M
 • 6 outlet surge board for total protection of 6 items plus phone line
 • Comes with Belkin's Lifetime Warranty - only buy it once!
 • Comes with \$150,000 connected equipment warranty for total protection of your valuables

N3367

\$99

HOME SERIES 4-WAY (2M CORD) + \$40,000 WARRANTY



F9H400AU2M
 • 4 outlet surge board for total protection of 4 items plus phone line
 • Comes with Belkin's Lifetime Warranty - only buy it once!
 • Comes with \$40,000 connected equipment warranty for total protection of your valuables

N3358

\$45

SOHO SERIES UPS SERIAL & USB 650VA - \$100,000 WARRANTY



F6H650AUUNV
 In a power outage or brownout, the SOHO Battery Backup automatically switches your computer to battery backup power and gives you the time to save open files and safely power off. As the leading developer of power protection solutions, Belkin engineers and rigorously tests all its products to ensure your equipment will be safe from harmful electrical disturbances.

BENEFITS

- Provides up to 30 minutes of backup time
- Battery capacity load: 650VA (390W)
- 3 battery backup sockets, 3 surge-protected-only sockets
- USB and Serial communication ports
- Shuts down your system and documents safely with included Belkin Power Management Software
- Provides DSL/broadband protection (RJ11 ports 1-in, 1-out)
- Filters electromagnetic/radio frequency interference (EMI/RFI)
- Provides quality surge protection with 1620J
- Comes with a Belkin 3-year product warranty and \$100,000 connected equipment warranties

M0848

\$299

PLEASE NOTE:

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Logitech

CORDLESS AND OPTICAL COMBINATIONS

QUICKCAM IM



BONUS
Headset & clip
Included

Logitech® QuickCam® IM lets you get closer instantly with live video and audio. Add live video to your favorite IM. Works with MSN® Messenger, Yahoo!® Messenger & Windows® Messenger. QuickCam IM includes a bonus headset for private conversations and a bonus clip.

N9485

\$79QUICKCAM
FOR NOTEBOOKS

Portable and easy to use, Logitech QuickCam for Notebooks is a great way to stay connected at home or on the go. VGA-quality video, integrated microphone and snapshots up to 1.3 megapixels (interpolated) make this camera a versatile performer.

S6907

\$65STEREO USB
HEADSET 250

Using digital USB technology, it enhances audio quality and provides simple plug and play functionality. Its noise cancelling microphone improves performance, while the leatherette ear pads and adjustable headband enhance comfort.

R7933

\$59PREMIUM USB
HEADSET 350

This convenient headset features soft touch in-line volume and mute controls. Its noise cancelling microphone improves performance, while the plush ear pads and premium headband enhance comfort.

R7934

\$70

PLEASE NOTE:

All purchases subject to terms & conditions and returns policy. Delivery charges may apply. Not all items stocked in store but available for pick-up/delivery.

NOTEBOOK OPTICAL
MOUSE PLUS

Simplify your mobile life. The Logitech® Notebook Optical Mouse Plus goes where you go, with built-in cord management for easy packing, all-terrain optical tracking for maximum surface coverage and shock-resistant bodywork to withstand bumps on the road. The perfect balance of comfort and mobility. USB. 3 year warranty.

N1740

\$45MX 1000 CORDLESS
LASER MOUSE

Experience the world's first laser mouse. The Logitech® MX™ 1000 Laser Cordless Mouse delivers 20x the tracking power of standard optical mice, tracking precisely on surfaces where LED-based optical mice tend to falter. Optical is now obsolete. Maximise your performance with the most advanced navigation and power management features available. USB and PS/2. 3 year warranty.

P3351

\$145

CORDLESS DESKTOP EXPRESS



Ready, set—go cordless. Logitech's easy set-up cordless keyboard and mouse combination gives any user the perfect blend of quality, performance, and affordability. The Cordless Desktop Express™ offers convenient one-touch keyboard controls for Web access or e-mail, and precise optical mouse performance. Your work space will be easier to manage too. 5 year warranty.

Q2404

\$59V-200 CORDLESS
NOTEBOOK MOUSE

Maximise productivity, minimise downtime. Compact, with up to 1 year of battery life, the Logitech® V200 Cordless Notebook Mouse guarantees comfort and reliable performance on the road. With 2.4GHz cordless technology providing interference-free operation, a storable micro-receiver for easy transport, Invisible Light optical tracking and tilt wheel plus zoom, V200 is ideal for travel. Available in black and silver. 5 year warranty.

S3296 SILVER

\$59

S3300 BLACK

\$59CORDLESS CLICK PLUS
OPTICAL MOUSE

Introducing a smarter way to go cordless. The Logitech® Cordless Click™ Plus includes a revolutionary wireless mini receiver in a compact design that eliminates clutter, installs instantly, and is perfect for desktops or notebooks. Other features include a tilt wheel for side-to-side scrolling and Internet forward/back buttons. USB and PS/2. 5 year warranty.

Q2454

\$75

CORDLESS DESKTOP LX 300



The Logitech® Cordless Desktop® LX 300 cleans up your work space, and empowers your style. Control music and video playback, open e-mail or Instant Messenger, or navigate the Web directly from the keyboard. Distinctive F-keys are programmable. Premium cordless optical mouse tracks precisely, while a new ultra-flat keyboard delivers leading-edge comfort. 5 year warranty.

R3185

\$79

USB - STORAGE & CONNECTIVITY

COMSOL USB VOIP PHONE

This fully-featured USB VoIP Phone allows you to talk to friends or colleagues just like a normal telephone. Used in conjunction with Skype or similar software, it offers you a complete free Internet telephony solution*.

SKYPE ready - talk for free with other Skype users

Works with most leading VoIP providers

Make huge savings on local, standard and international calls

Ideal for the mobile traveller

LCD display, keypad and ringer

Echo cancellation and noise reduction

Note: Standard internet charges apply depending on your provider



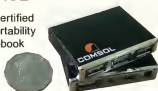
C5200

\$69

COMSOL 4 PORT USB 2.0 MINI HUB

Hi-Speed USB 2.0 certified
Ultra compact for portability
Ideal for mobile notebook
users

Transfer speeds
up to 480Mbps

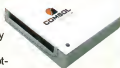


S1276

\$29

COMSOL USB 2.0 CARD READER 27-IN-1

- Hi-Speed USB 2.0 certified
- Supports most popular memory card formats
- Transfer files by user friendly drag-and-drop
- Supports plug & play and hot-swapping



R5964

\$39

COMSOL USB BLUETOOTH ADAPTER

- Enable Bluetooth connectivity on a notebook or desktop PC
- Bluetooth v1.2 certified
- Ideal for mobile phones, PDAs, headsets, printers etc.
- Operation range up to 40m



S6934

\$69

COMSOL SD CARD READER + MP3 PLAYER

- Combined SD Card Reader + MP3 Player
- 1 x Internal FireWire 6 pin port
- Hi-Speed USB 2.0 certified
- Includes stereo headphones
- Supports SD, MMC & RSMC storage cards (not included)



R9652

\$49

COMSOL 5 PORT USB 2.0 HI-SPEED PCI CARD

- 4 x External USB 2.0 ports
- 1 x Internal USB 2.0 port
- Backward compatible with USB 1.1 devices
- Data transfer rate up to 480Mbps for each port



N2275

\$39

COMSOL 3 PORT IEEE1394 FIREWIRE PCI CARD

- 3 x External FireWire 6 pin ports
- 1 x Internal FireWire 6 pin port
- Add IEEE1394 FireWire support to your PC or Mac notebook
- Ideal for digital cameras, hard drives, CD-RWs and other FireWire devices



D8946

\$45

COMSOL USB 2.0 FLASH DRIVES

flashIT²


- Hi-Speed USB 2.0 certified
- Password security feature
- True plug & play
- PC & Mac compatible

S3103 256MB

\$49

S3104 512MB

\$79

S3105 1GB

\$149

COMSOL USB 2.0 EXTERNAL HDD ENCLOSURE



USB 2.0 to IDE interface board and hard drive enclosure package. Just drop in your 2.5" IDE hard drive and you have a hot-swappable, platform-independent, high-speed portable drive!

N0959

\$49

PLEASE NOTE:

All purchases subject to terms & conditions and returns policy. Delivery charges may apply. Not all items stocked in store but available for pick-up/delivery.

INTELLIGENT KVM SOLUTIONS

SERVERLINK ELITE KVM SWITCHES

Bonus
2m cables
Until 31
August 2005



The ServerLink Elite KVM switches allow you to control your servers with a single keyboard monitor and mouse. Using high-density connections, these 8 and 16 port switches use only 1U of rack space making them the ideal choice for any server room where space is at a premium.

8 PORT ELITE KVM

Including 8 x 2m Cables

P2748 **\$549**

16 PORT ELITE KVM

Including 16 x 2m Cables

Rent* \$7.83/wk

P2749 **\$699**

SERVERLINK IP REMOTE ACCESS DEVICE



Access your servers from anywhere in the world! The ServerLink IP allows network administrators to manage, configure, troubleshoot and even reboot remote servers from any web browser.

Rent* \$8.86/wk

Q5544 **\$774**

*RENTSMART

The figures quoted are on a per week basis over 3 years. Terms and conditions apply.

PLEASE NOTE:

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SERVERLINK KVM EXTENDER

The ServerLink KVM Console drawers are designed for applications where space is at a premium or CRT displays are undesirable. With a 15" or 17" TFT LCD screen, keyboard, touchpad and integrated KVM switch housed in an industry standard 19" 1U-height rack drawer, these LCD KVM switches save you up to a third of valuable rack cabinet space.

Connect the ServerLink LCD Rack Drawer to any existing KVM switch and increase your server management capacity. The unique modular design means the Snap-In KVM Switch Modules can be interchanged at any time, allowing easy expansion as your server room grows. You can also cascade additional KVM switch modules to control up to 136 servers.

- Modular design allows for easy expansion
- A Grade 15" or 17" LCD panel with zero dead pixels
- Locking mechanism locks the drawer when pulled out and pushed in
- Keyboard and mouse can be hot plugged at any time
- Standard PC99 colour coded connectors for PC Connection
- Replaceable keyboard and touch pad
- Standard 19" 1U rack drawer
- Also available in 16 port

PS/2 & USB



Model	LKS-101H	LKS-801C	LKS-1601C	LKS-1017H	LKS-8017C	LKS-16017C
No. of Computer Ports	1	8	16	1	8	16
LCD Panel Size	15"	15"	15"	17"	17"	17"
KVM Platform Support	N/A	PS/2 & USB	PS/2 & USB	N/A	PS/2 & USB	PS/2 & USB
Maximum Resolution	1024 x 768	1024 x 768	1024 x 768	1280 x 1024	1280 x 1024	1280 x 1024
Rent*	\$24.56/wk	\$28.83/wk	\$31.55/wk	\$27.76/wk	\$30.50/wk	\$34.71/wk
Part Number	H2100	H2101	S6919	P2058	N9128	N9125
Price	\$2,299	\$2,699	\$2,999	\$2,599	\$2,899	\$3,299

CABLES REQUIRED FOR SERVERLINK LCD - USE PS/2, USB OR COMBINATION OF BOTH

1.8m LCD KVM Cable - PS2/VGA

H8782 **\$29**

1.8m LCD KVM Cable - USB/VGA

P8157 **\$29**

6m LCD KVM Cable - PS2/VGA

H8784 **\$59**

5m LCD KVM Cable - USB/VGA

P8159 **\$59**

SERVERLINK LCD KVM RACK DRAWERS

The ServerLink KVM Extenders allow you to use standard Cat5 cabling to extend your monitor, keyboard and mouse up to 150m away in a remote location. You can also connect a second computer at the remote location, giving you control of both computers. Supports PS/2 keyboard & mouse.

- Control a single computer locally and remotely
- Uses Cat5/Cat5E/Cat6 UTP cabling
- Adjustable Video compensation for optimum signal
- Supports video resolution up to 1600 x 1200



S6923 SERVERLINK KVM EXTENDER FOR PS/2

\$499

LINKSYS®

A Division of Cisco Systems, Inc.

harris technology



Networking

A LEADER IN WIRELESS NETWORKING

DSL2 USB, ETHERNET MODEM ADSL2MUE



Harness the full potential of the Internet with the Linksys ADSL2 Modem
High-speed ADSL modem gives you a fast, "always on" connection to the Internet
Up to 12Mbps download speeds, 200 times faster than dial-up analog modems
Shares your existing telephone lines to connect to the Internet, without tying up the phone
Connects to your PC over 10/100 Ethernet or USB

4 PORT ADSL2 GATEWAY SWITCH - AG241



- High speed ADSL Modem
- Built-in Router and 4 port switch
- Jump start your Ethernet network and share the Internet throughout your household
- Advanced firewall and security features protect your PCs, your data, and your family
- Compatible with both ADSL1 or ADSL2 standards

WIRELESS-G BROADBAND ROUTER WITH SRX - WRT54G



- Internet-sharing router, 4 port switch, with a built in speed and range enhanced Wireless-G (802.11g) Access Point
- Shares a single Internet connection and other resources with Ethernet wired, Wireless-G, -B, and other SRX devices
- New SRX technology: the farther away, the more advantage up to 8 times faster than standard Wireless-G (802.11g)
- SRX also increases wireless range by up to 3 times and reduces dead spots in coverage area

WRT54G ROUTER + WPC54G ADAPTER BUNDLE



WRT54G Details:

- All-in-one Internet-sharing router, 4 port switch, and Wireless-G (draft 802.11g) Access Point
- Wireless data rates up to 54Mbps 5 times faster than Wireless-B (802.11b)
- Advanced wireless security with 128-bit WEP encryption, Mac or IP address filtering
- 1 year limited warranty

WPC54G Details:

- High-speed Wireless-G (draft 802.11g) networking for your notebook computer
- Data rates up to 54Mbps - 5 times faster than Wireless-B (802.11b)
- Wireless security - up to 128-bit WEP encryption
- 1 Year Limited Warranty

R9752

\$95

R8981

\$155

R8671

\$299

802.11G 54MBPS WIRELESS-G PCI ADAPTER - WMP54G



Wireless-G (draft 802.11g) connectivity for your desktop PC. Up to 54Mbps in the 2.4GHz radio band. Interoperates with Wireless-B (802.11b) networks at 11Mbps.

802.11G 54MBPS WIRELESS-G USB ADAPTER - WUSB54G



- Connects your desktop or notebook to a wireless network at up to 54Mbps when used with a USB 2.0 port
- Easy, no-tools setup on any desktop or notebook computer with USB support
- Also compatible with Wireless-B networks (at 11Mbps)
- Wireless communications are protected WPA encryption

WIRELESS-G RANGE EXTENDER - WRE54G



- The easiest way to expand your wireless network's coverage
- Save on wiring costs - no wired connection to your network necessary
- Extend your wireless signal into hard-to-reach areas
- Compatible with both Wireless-G and Wireless-B networking clients

N0240

\$179

WIRELESS G ADSL GATEWAY - WAG54G



- ADSL modem with 4 x 10/100 switch ports
- Wireless 802.11G 54MB access point, supports both 11MB & 54MB clients
- Wireless security includes WEP, WPA & 802.1x
- Powerful stateful packet firewall with denial of service attack prevention
- VPN server, 5 VPN tunnels - also supports VPN pass-through
- 3 year manufacturer exchange warranty

M5307

\$189

PLEASE NOTE:

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H9737

\$89

M6496

\$79

P9344

\$129

WIRELESS / BROADBAND SOLUTIONS

DWL-G730AP



BONUS
DWL-G630
Wireless LAN
PCMCIA card

Portable Wireless Connectivity
The DWL-G730AP is a portable and convenient wireless solution for the traveling business person delivering 802.11g wireless connectivity with a maximum wireless signal rate of up to 54Mbps. Use it in conference rooms, hotel rooms, or even at hotspots.

R7529

\$145

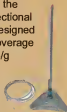
D-LINK ANT24-0600 INDOOR 6DBI GAIN DIRECTIONAL ANTENNA

D-Link Indoor 6dBi Gain Directional Antenna, panel directional, IEEE 802.11b Wireless LAN, SMA, Reverse SMA to TNC connector, IEEE 802.11b Wireless LAN. Providing 2 to 2.5 times the output over bundled dipole antennas (2dBi). Works with all AP/Routers to boost high-speed wireless signal in a specific direction. Supporting a plug-and-play installation.

ANT24-0600
R2651**\$89**

INDOOR 7dBi GAIN OMNI-DIRECTIONAL ANTENNA

D-Link, an industry leader in networking, introduces the ANT24-0700 omni-directional 7dBi indoor antenna designed to provide extended coverage for an existing 802.11b/g wireless network.

ANT24-0700
S0749**\$97**

PLEASE NOTE:

All purchases subject to terms & conditions and returns policy. Delivery charges may apply. Not all items stocked in store but available for pick-up/delivery.

DGL-4300

- Optimised gaming experience
- Up to 108Mbps* 802.11g wireless connectivity
- 4 gigabit ethernet ports
- Customisable settings for games and applications

NEW!

*Maximum wireless signal rate derived from IEEE Standard 802.11g specifications. Actual data throughput will vary.

L6109

\$349

54Mbps DESKTOP BUNDLES

DI-524 + DWL-G510 BUNDLE

- D-Link DI-524 2.4GHz 802.11g Wireless Router
- D-Link AirPlusG Enhanced 2.4GHz (802.11g) Wireless PCI Adapter



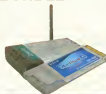
S1177

\$149

54Mbps NOTEBOOK BUNDLE

DI-524 + DWL-G630 BUNDLE

- D-Link DI-524 2.4GHz 802.11g Wireless Router
- D-Link DWL-G630 11/54Mbps Wireless LAN PCMCIA card



S1156

\$149

DGL-4100

- Optimised gaming experience
- 4 gigabit ethernet ports
- Customisable settings for games and applications

NEW!

C9274

\$299

108Mbps DESKTOP BUNDLES

DI-624 + DWL-G520 BUNDLE

- D-Link DI-624 Wireless G Router
- D-Link DWL-G520 Wireless PCI Adapter



S1284

\$179

108Mbps NOTEBOOK BUNDLE

DI-624 + DWL-G650

- D-Link DI-624 Wireless G Router
- D-Link DWL-G650 Wireless 2.4GHz CardBus Adapter



S1285

\$179

SECURITY SOLUTIONS

ADSL 2/2 + MODEM/ROUTER WITH USB/ETHERNET PORT

DSL-502T

The DSL-502T is an ADSL Internet Gateway Router designed for the small office and home. This router lets you quickly and easily connect to high-speed broadband Internet and share your ADSL line. With a built-in ADSL interface, USB/Fast Ethernet port and advanced functions, this router gives your business and home a convenient and cost-effective way to install a secure, fast network link to the outside world.



R6714

\$119

D-LINK DSL-504T ADSL/ADSL-2 ROUTER WITH 4 PORTS

DSL-504T

The router functionality on the DSL-504T ADSL Router Modem includes support for VPN pass-through of multiple concurrent IPSec and PPTP tunnels, making it especially useful for telecommuters or users who need a more secure way to communicate and transmit information. The DSL-504T ADSL Router Modem supports static IP, Dynamic IP, as well as PPPoE connections.



S1493

\$149

ADSL MODEM/ROUTER WITH 54Mbps WIRELESS

DSL-G604T

The DSL-G604T is an ADSL router designed for home or office use. It lets you quickly and easily connect to high speed broadband Internet and share your ADSL line.

- ADSL2, ADSL2+ Upgradeable
- 4 port fast ethernet & 802.11g wireless connectivity
- Supports WPA security
- Secure NAT/DHCP functions
- Telstra approved
- Supports all major ISP'S
- 3 years warranty



P3062

\$199

SWITCHING SOLUTIONS

WIRELESS INTERNET CAMERA PROMOTION

BUY A DCS-2100G AND RECEIVE BONUS ACCESS POINT BUNDLED.

Available while stocks last

D-Link Wireless IP Camera and Wireless Access Point Bundle



Rent* \$6.71/wk

C7273

\$599

16 PORT POE 10/100MBPS SMART SWITCH



DES-1316

Provides 16 x 10/100Mbps Ethernet ports, of which 8 ports support PoE for device connection, and the other 8 ports without PoE for workstation/server attachment. Complying with industry standard 802.3af Power over Ethernet (PoE), the PoE ports provide power over the normally unused pairs of the Ethernet cables, which makes it very valuable for deployment of VoIP phones, remote surveillance cameras and wireless access points.

Rent* \$7.67/wk

R7521

\$685

48 PORT 10/100 STACKABLE SWITCH



DES-3550

D-Link's DES-3550 Single IP Management technology is equipped with 48 10/100BASE-TX ports and 2 combo 1000BASE-T/SFP Gigabit in a low-profile rackmount box. Designed for secure and flexible connection.

Rent* \$17.09/wk

N9094

\$1,525

WIRED INTERNET CAMERA PROMOTION

BUY A DCS-2100 AND RECEIVE BONUS ACCESS POINT BUNDLED.

Available while stocks last

D-Link Wired IP Camera and Gigabit Switch Bundle



C7156

\$499

POWER OVER ETHERNET (POE) ADAPTER



DWL-P50

The DWL-P50 is useful for installation at a factory or Wi-Fi hot spot. This compact adapter allows you to install your surveillance cameras and wireless LAN devices on a building rooftop, on or near a ceiling for maximum coverage. Your cameras or wireless access points can be placed up to 100 metres away from a power source.

R7524

\$60

24 PORT 10/100 STACKABLE SWITCH



DES-3526

10/100Mbps stackable switches are mutually stackable switches that feature single IP management technology. Equipped with 24 10/100BASE-TX ports and 2 combo 1000BASE-T/SFP gigabit in a low-profile rackmount box, these switches are designed for secure and flexible connection.

Rent* \$10.92/wk

N9097

\$975

DES-1005D DESKTOP 5 PORT Dual Speed 10/100Mb Ethernet/ Fast Ethernet NWay auto-negotiating Switch.



85101

\$55

DES-1008D DESKTOP 8 PORT Provides SOHO users W/ MB access for video, high speed data and internet.



98254

\$85

DES-1016D 16 PORTS 10/100Mbps UNMANAGED Fast Ethernet Unmanaged Switch. Includes Rackmount kit.



F0915

\$149

DES-1024D 24 PORT 10/100Mbps FAST ETHERNET Unmanaged Switch Includes Rackmount kit.



G1783

\$239

D-LINK DGS-1005D 5-PORT 10/100/1000 UNMANAGED SWITCH 10Gbps Switching Capacity with Desktop or Wall-Mount Design.



K8301

\$155

*RENTSMART

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QUANTUM PROTECTS YOUR DATA & YOUR BUDGET!

QUANTUM TAPE MEDIA

DLT TAPE IV

CompacTape IV (20/40, 35/70&40/
80GB) DLT Tape

71231

\$69

QUANTUM SDLT1

SDLT1 Tape (110/220GB&160/
320GB)

B9825

\$79

QUANTUM SDLT2

Media for the SDLT600

N4918

\$179

CALL HARRIS TECHNOLOGY ON
1300 13 9999 FOR ASSISTANCE
WITH DETERMINING THE BEST
SOLUTION FOR YOUR DATA
NEEDS.



COPY OF "BACKUP BASICS"
AVAILABLE FOR DOWNLOAD
ONLY AT QUANTUM.HT.COM.AU

QUANTUM WARRANTY

Available for all models. 3-year
rapid exchange warranty with
telephone & online support.
On-site installation and on-site
service optional.

RENTSMART

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week basis over 3 years. Terms and
conditions apply.

PLEASE NOTE:

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conditions and returns policy.
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Not all items stocked in store but
available for pick-up/delivery.

Data is the most valuable asset your business owns. Without it, people sit idle, your network is inoperable, and your business goes dark. Every minute and every megabyte has a cost. Are you fully protected? Quantum protects the world's mission-critical data with simple, scalable storage solutions from the desktop to the data centre.

**BACKUP
BASICS**
**ULTRIUM
LTO**
DLT

TAPE DRIVES

From entry-level to enterprise, Quantum tape drives are inexpensive devices to protect your data

QUANTUM DAT-72

INTERNAL TAPE DRIVE, ULTRA2 SCSI, BLACK


**BONUS
MP3 Player[^]**

Most cost effective tape solution for small to medium-sized businesses, DAT-72 has 72GB of compressed storage and is backward compatible with DDS-3 and DDS-4.

Rent* \$12.33/wk

Q4591

\$1,100

QUANTUM LTO-3

INTERNAL TAPE DRIVE, ULTRA SCSI LVD, BLACK


**BONUS
MP3 Player[^]**

Delivering up to 800GB capacity on a single cartridge and backup speeds of up to 490GB/hr, CL 800 is backward compatible to LTO-1.

Rent* \$75.45/wk

R2191

\$8,999

QUANTUM SDLT 600

INTERNAL TAPE DRIVE, SCSI 160, BLACK (TR-S)


**BONUS
MP3 Player[^]**

Featuring an unprecedented 72MB/s compressed transfer rate and a colossal 600GB of compressed storage, there's never been anything quite like it.

Rent* \$65.86/wk

Q9119

\$7,399

QUANTUM SUPERLOADER™ 3

Delivers superior tape automation at an affordable pricing and incorporates advanced features such as remote management, barcode reader and Veritas Backup Exec™ software as a standard.

QUANTUM SUPERLOADER 3 WITH ONE LTO-2
DRIVE


NEW!

SuperLoader 3 combines the widest range of drive options including DLT VS160, SDLT 600, LTO-2 and LTO-3 to support data requirements between 100GB and 5TB.

Rent* \$72.09/wk

S7250

\$8,099

BONUS MP3 PLAYER OFFER

[^]Quantum end-users in Asia-Pacific only who purchase a qualifying Quantum product (Quantum DAT 72 standalone drive, SDLT 600 standalone drive, LTO-3 standalone drive) between 1 March 2005 and 30 September 2005 will be eligible to receive a BONUS MP3 Player. To receive your MP3 Player, please complete the online claim form. For more details regarding this promotion and to access the online claim form please visit http://www.quantum.com/mp3_promo_details. Claim form must be received before 15th October 2005.

BROADBAND SOLUTIONS FOR HOME & SMALL BUSINESS

NB5PLUS4W ADSL2+ MODEM ROUTER WITH BONUS LSV40 USB VOIP PHONE



- Versatile ADSL2+ modem router with USB, 4 Ethernet ports and 54Mbps Wireless Access Point
- Advanced security firewall (SPI) and VPN pass-through
- Access Point features WEP and WPA wireless security
- Includes a Quality of Service (QoS) function to prioritise particular types of data make it ideal for VoIP-use
- Includes bonus NetComm LSV40 USB VoIP Phone and includes VoIP service, VoIP telephone number and Free voicemail box

*Offer ends 31st August or while stocks last.

S6961

\$199

NB5PLUS4 ADSL2+ MODEM ROUTER



- Versatile ADSL2+ modem router with USB and 4 Ethernet ports
- Advanced security firewall (SPI) and VPN pass-through
- Supports ADSL, ADSL2 and ADSL2+
- Includes a Quality of Service (QoS) function to prioritise particular types of data make it ideal for VoIP-use

S1159

\$149

NB5 ADSL/ADSL2 ETHERNET MODEM/ROUTER



- USB and 10/100 Ethernet port which can be used simultaneously to connect multiple PC's to the broadband Internet service
- Includes an Active Firewall and Port Forwarding function
- Universal Plug and Play (UPnP)
- Easy Installation
- ADSL2 compatible

P7335

\$125

BROADBAND WIRELESS ROUTER FOR CABLE/ADSL NB620W

- Powerful and feature-packed wireless gateway
- Includes 2 x USB ports including print server, 4 x 10/100 Ethernet switch, Active firewall, Super "g" / 802.11g/b wireless access point, WEP and WPA wireless encryption and more...



\$50 CASH BACK*

VOIP ANALOGUE TELEPHONE ADAPTOR (ATA) WITH SERVICE PROVIDER BUNDLE V100LS*

- Designed to connect a standard telephone handset.
- Delivers quality, reliable, real-time Internet voice calls
- Ideal for residential and small business users
- Can significantly reduce long distance call charges



*Products use NetComm hardware and include \$5 credit for use with VoIP service from MyNetFone.

R6466

\$129

NP210 ETHERNET OVER POWER ADAPTOR KIT



NetComm HomePlug is an Ethernet over power adaptor that allows you to network up to 15 devices using your home or office power supply. Simply plug the NetComm HomePlug into a power point and connect your device with an Ethernet cable - it really is that easy!

*Note: All home plugs must be on the same power circuit

R9904

\$189

NETCOMM GIGABIT SWITCHES

NP3005 GIGABIT SWITCH



L2659

\$149

NP3016 16 PORT GIGABIT SWITCH



P2350

Rent* \$9.51/wk

\$849

NP3024 24 PORT GIGABIT SWITCH



P2351

Rent* \$11.19/wk

\$999

*RENTSMART

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MAKE A SMART DECISION - MANAGED SWITCHES AT AN UNMANAGED PRICE

FS108P - PROSAFE™ 8 PORT
10/100 SWITCH WITH 4 PORT
POWER OVER ETHERNET

- Supply power to wireless access points and surveillance cameras over Cat-5 cabling
- IEEE 802.3af power on up to 4 ports
- 8 10/100Mbps Ports with AutoUplink™
- Small, compact, quiet design fits on desktop or wall
- Zero configuration required - power is automatically supplied to compliant devices

Q9509

\$279WG102 PROSAFE™ 802.11G
WIRELESS ACCESS POINT

- High-speed IEEE 802.11g, up to 108Mbps in turbo mode
- Wi-Fi Protected Access™ (WPA) - 802.11i security
- Integrated IEEE 803.3af Power over Ethernet (PoE)
- Detachable 5 dBi antenna
- SNMP MIB I, MIB II, and 802.11 MIB support
- Wireless Distribution System (WDS) bridging and repeater modes
- Plenum-rated, Wi-Fi Certified

Q0634

\$239

RENTSMART

The figures quoted are per week basis over 3 years. Terms and conditions apply.

PLEASE NOTE:

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A smart switch has many of the benefits of a managed switch without the complexity or cost of a fully managed switch. With a smart switch, you can monitor ports, configure trunks, and set prioritisation, all with an intuitive Web interface. A smart switch has more capability than an unmanaged switch, but not all that of a fully managed switch. For example, a smart switch can configure ports, set up trunking, and even virtual LAN's (VLAN's), but it cannot participate in SNMP. The default settings match what you would find in an unmanaged switch, so you can use them right out of the box without even touching the management features.

The Smart Switches ship with the SmartWizard Discovery program that will discover the switch on your network, enabling you to connect to the switch via your web browser. Configuration after that is through an intuitive web browser interface.

Model	FS726T	FS726TP	FS750T2	GS716T	GS724T	GS748T
10/100 Ports	24	24	48	-	-	-
10/100/ 1000 Ports	2	2	2	16	24	48
Module Slots	1	2	2	2	2	4
QoS/VLAN/DHCP/ Port Trunking	Yes	Yes	Yes	Yes	Yes	Yes
Throughput (Gbps)	8.8	8.8	13.6	32	40	48
PoE (Power over Ethernet)	no	12	no	no	no	no
Warranty	Limited 5 years	Limited 5 years	Limited 5 years	Limited 5 years	Limited 5 years	Limited 5 years
Rent*	\$5.50/wk	\$5.50/wk	\$7.83/wk	\$6.50/wk	\$11.25/wk	\$22.15/wk
Part #	R0482	S7039	N3143	S7139	N3147	Q9557
	\$498	\$749	\$969	\$795	\$1,065	\$2,069

PROSAFE™ VPN FIREWALL 200



FVX538

- 8 10/100 ports and 1 Gigabit LAN port to share your Internet connection
- One console port for local management
- 200 simultaneous VPN tunnels
- Quality of Service (QoS) traffic prioritisation
- Hardware DMZ and 256-bit Advanced Encryption Standard (AES)
- VPN Wizard & SmartWizard™ for ease of configuration
- ProSafe VPN Client software 5-user license
- VPNC Certified

Rent* \$7.83/wk

R0509

\$699

PROSAFE™ VPN FIREWALL 25



FVS124G

- Dual 10/100 WAN Ports and 4 Gigabit LAN Ports
- Up to 25 simultaneous IPSec VPN tunnels
- True Firewall with Stateful Packet Inspection (SPI) and Intrusion Detection
- 168-bit 3DES, 256-bit AES IPSec encryption
- SNMP Manageable - compatible with Netgear ProSafe Network Management Software NMS100
- Bundled with ProSafe VPN Client software - single user license
- VPNC Certified

S7022

\$369



NETGEAR™

harristech technology



Networking

NETGEAR RANGEMAX™ - WIRELESS TO THE MAX

SMART BROADBAND VOICE ADAPTER TA612V



NEW!

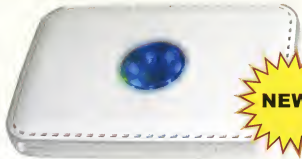
Netgear's TA612V Smart Broadband Voice Adapter allows you to make calls just the way you do today with your existing phone. Just plug in the TA612V to a broadband modem and phone, sign up for VoIP phone service, and start calling. It's that easy! Reduce your phone bill with VoIP phone service that often are flat rate for unlimited local and long distance calls. Make international calls at amazingly low rates too. Caller ID, Call Waiting, Call Return, Call Back on busy, 3 way Conference call, and Voice Mail just to name some of the available the ideal VoIP terminal adapter delivering convergent voice services to the small networking environment.

The TA612V features two phone ports for connection to existing analog phones and fax machines. A WAN Ethernet port connects the TA612V to the Internet via a broadband modem (cable, DSL), and a LAN Ethernet port is available to provide connectivity and router/firewall functionality for sharing the Internet connection with your computers. The TA612V supports prioritised voice traffic for optimum Quality of Service (QoS).

34266 TA612VMN - BUNDLED WITH MY NETPHONE VOICE SERVICE PROVIDER

\$179

RANGEMAX WIRELESS ACCESS POINT WPN802



NEW!

- Extends your Ethernet network with high-speed wireless access, up to 108 Mbps
- RangeMax™ Smart MIMO (Multi-In, Multi-Out) technology navigates through possible interference
- Fully compatible with Wi-Fi certified 802.11b, 802.11g, and SuperG® devices
- Security through WPA-PSK, MAC address authentication and up to 128-bit WEP data encryption
- SmartWizard™ Installation Assistant

A6081 WPN802 "RANGEMAX" WIRELESS ACCESS POINT

\$249

R5401 WPN824 "RANGEMAX" WIRELESS G ROUTER + 4 PORTS

\$205

R4068 WPN511 "RANGEMAX" WIRELESS G NOTEBOOK ADAPTER

\$109

ADSL 2/2+ 54MBPS WIRELESS ADSL MODEM ROUTER



DG834GT

- Combines modem, router, 4 port 10/100 switch, 802.11g access point, and SPI True Firewall
- Up to 5x faster than 802.11b
- Smart Wizard™ detects/connects to your ISP
- Virtual Private Network (VPN) pass-through

Q5517

\$239

NETGEAR WGR614 WIRELESS G ROUTER + WG511 NOTEBOOK ADAPTER BUNDLE



HOT PRICE!

WGR614

- Speeds of 802.11g - up to 5x faster than 802.11b
 - 10/100Mbps on WAN
 - Double Firewall - SPI & NAT
 - Smart Wizard for automatic ISP detection
 - Compatible with 802.11b devices
 - Shares broadband Internet access
 - Wi-Fi Protected Access Pre-Shared Key (WPA-PSK)
 - Up to 128-bit WEP encryption
 - VPN pass-through support
 - Mac address authentication
- WG511
- Wireless PC-Card
 - BUS: 32bit
 - 54Mbps
 - 40/64bit, 128bit WEP encryption
 - Virtual Private Network (VPN) pass-through

Q0913

\$119

PLEASE NOTE:

All purchases subject to terms & conditions and returns policy. Delivery charges may apply. Not all items stocked in store but available for pick-up/delivery.

SEAGATE EXTERNAL HARD DRIVES

5GB POCKET
HARD DRIVE USB 2.0HOT
PRICE

The Seagate 1" external hard drive is the biggest small hard drive on the planet, with up to 5GB capacity. Breaking traditional cost/performance barriers, this innovative solution is available in a cool looking, USB 2.0 bus powered design. This 1" external drive is optimised to deliver high performance, low power consumption and reliability in a compact physical package.

APPLICATIONS

- Robust design and high shock tolerance enable mobility in demanding operating environments
- Best solution for highly portable data transfer
- Great for carrying music, photos and business files
- One year manufacturer warranty

Q3001

\$249

BONUS BUNDLE

Purchase either a Seagate external hard drive 3.5" or a Seagate portable drive 2.5" (Part No: S7107, S7108, S7109, S7110 or S7111) and receive bundled a BONUS: MSI StarCam 370i. Offer available until 31/07/05 or while stocks last.

*RENTSMART

The figures quoted are based on a per week basis over 3 years. Terms and conditions apply.

PLEASE NOTE:

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EXTERNAL HARD DRIVE 3.5"
7200 RPM FIREWIRE/USB 2.0BONUS
StarCam 370i
BUNDLE#

HIGH CAPACITY, AMAZING PERFORMANCE

These high capacity drives make it easy to store and backup your data. You can safely store business files, movies and photos, the latest games, your favourite music and more. And the interlocking design lets you securely expand your Seagate storage.

ENGINEERED FOR HIGH PERFORMANCE

7200 RPM drive with 8MB cache and whisper quiet motor lets you effortlessly store and work with massive amounts of data.

BUILT FOR SAFETY AND SECURITY

Seagate hard drives are safeguarded by built-in self monitoring technology that continuously checks your hard drive for data safety and drive performance. SeaTools diagnostic software is included.

WORRY FREE, ONE YEAR WARRANTY

Warranty covers all parts and labour.

DRIVE SPECIFICATIONS

- 8MB cache
- 7200 RPM
- 350 Gs non-operating shock resistance
- Mac and PC compatible

S7107 200GB (USB 2.0+FireWire)

\$349

S7108 300GB (USB 2.0+FireWire)

\$449

Rent* \$6.71/wk

S7109 400GB (USB 2.0+FireWire)

\$599PORTABLE DRIVE 2.5"
EXTERNAL 5400 RPM USB 2.0BONUS
StarCam 370i
BUNDLE#

EXCEPTIONAL PORTABILITY AND PERFORMANCE

Enjoy easy storage and access of large digital music, photos, video, data and multimedia files both on the desk and on the go.

ENGINEERED FOR HIGH PERFORMANCE

This 5400 RPM hard drive features a whisper quiet SonicSoft FDB motor, and delivers 50 percent more performance than 4200 RPM drives - with no increase in power consumption. You get higher speed while conserving battery life.

FAST AND EASY

Supports speeds up to 480Mbps, is hot swappable and powered by the USB bus - there's no need for power cords or adapters.

BUILT FOR SAFETY AND SECURITY

Seagate hard drives are safeguarded by built in self monitoring technology that continuously checks your hard drive for data safety and drive performance. SeaTools diagnostic software is included.

WORRY FREE, ONE YEAR WARRANTY

Warranty covers all parts and labour.

DRIVE SPECIFICATIONS

- 2MB cache (40GB) / 8MB cache (100GB)
- 5400 RPM
- 5000 Gs non-operating shock resistance
- Mac and PC compatible

S7110 40GB

\$249

S7111 100GB

\$499



STORAGE SOLUTIONS

Porsche EXTERNAL
MOBILE DRIVES
USB 2.0 & FIREWIRE

NB: The key is not included

Lacie mobile drives, designed by FA Porsche, are the perfect companion to back up your notebook or use to transfer data from one computer to another. Made of magnesium and bus powered through the USB 2.0 & FireWire port. Weight only 200g and is 1.7 x 7.6 x 1.3cm in size.

BENEFITS

- Ultra-lightweight, portable design
- Hi-Speed USB & FireWire interface
- AC adapter free - powered by USB bus

SPECIFICATIONS

- Interface: Hi-Speed USB & FireWire
- Interface transfer rate: 480Mbps
- Rotational speed (rpm): 5400
- Size: 17 x 76 x 129mm / .65 x 3 x 5 in. (HxWxL)
- Weight: 200g / 7.05 oz.
- Seek time: <12 ms
- Buffer: 2MB (40GB) 8MB (60, 80 & 100GB)

40GB Porsche EXTERNAL
USB 2.0 & FIREWIRE MOBILE DRIVES2458 **\$229**60GB Porsche EXTERNAL
USB 2.0 & FIREWIRE MOBILE DRIVES2459 **\$285**80GB Porsche EXTERNAL
USB 2.0 & FIREWIRE MOBILE DRIVES1929 **\$339**100GB Porsche EXTERNAL
USB 2.0 & FIREWIRE MOBILE DRIVES2411 **\$475**

d2 EXTERNAL HARD DISK DRIVES



Lacie d2 drives have been designed for professional users in mind. Beyond the fact that they are robust, lightweight, fast cooling and noise free, these drives have unique features such as Kensington cable lock slot, autoswitch power on/off with your computer and are rackmountable in 19" rack.

BENEFITS

- Zamac alloy for fast cooling & robustness
- FireWire 800 for fast transfer rate
- USB & FireWire for convenience
- Rackmountable
- Kensington keylock for security
- Autoswitch on/off

SPECIFICATIONS

- Buffer size: 8MB
- Rotational speed: 7200rpm
- Seek time < 10ms
- Plug & play on Mac OS X & Windows XP
- Compatible with Mac OS 9.x & 10.x, Windows XP & 2000

250GB d2 EXTREME
USB/FIREWIRE/FW800Q0363 **\$469**500GB d2 BIGDISK
USB/FIREWIRE/FW800

Rent* \$8.50/wk

M1506 **\$759**1000GB d2 BIGGERDISK
USB/FIREWIRE/FW800

Rent* \$16.75/wk

M2819 **\$1,495**2000GB d2 BIGGERDISK EXTREME
FIREWIRE/FW800

Rent* \$39.05/wk

S3231 **\$3,749**EXTERNAL
LIGHTSCRIBE DVD
BURNER USB2.0 &
FIREWIRE

- DL DVD+R 2.4x
- DVD+R 16x
- DVD-R 8x
- DVD+/-RW 4x
- CD-R 40x
- CD-RW 32x

The Lacie D2 DVD±RW Drive is now available with LightScribe, an innovative new HP technology that allows for burning professional quality labels for CDs and DVDs without the hassle of a printer.

The very same laser that burns data onto discs can now also burn a precise, iridescent image directly onto your CDs and DVDs. Its that simple - just burn your disc, flip it over, and then burn the label. Compatible discs contain a thin dye coating finish that reacts to laser light in a chemical reaction, leaving a silkscreen-like image. Create your own fabulous custom designs with crisp text, graphics and photos, which you can add to again and again.

- Easily burn labels when ever discs are burned
- Convenient - no need for a printer
- Professional quality laser precision and detail

R4036 **\$289**

*RENTSMART

The figures quoted are based on a per week basis over 3 years. Terms and conditions apply.

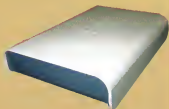
PLEASE NOTE:

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*Total access capacity varies depending upon operational environment

PC, NETWORK & SERVER STORAGE SOLUTIONS

MAXTOR PERSONAL STORAGE 3100



THE EASY ECONOMICAL WAY TO ADD STORAGE

The Maxtor Personal Storage 3100 external hard drive provides instant storage to hold digital photos, music and data files. Ideal for the home and office, it's simple to install - just plug the external drive into an available USB port on your Windows PC and immediately get up to 80GB of extra space. Use the extra capacity to free up the space on your PC or to add more of your favorite files - the 80GB drive can hold up to 75,000 digital photos (JPEG normal) or up to 1650 hours of digital music (MP3).

The Personal Storage 3100 offers a dependable Maxtor hard drive for easy add-on storage to hold your important documents and precious memories. It works with both the fast USB 2.0 interface and USB 1.1.

FEATURES

- Easy installation
- USB 2.0 & 1.1 compatible
- USB 2.0 up to 40 times faster than USB 1.1
- Compact design
- Powered by a dependable Maxtor® hard drive
- Windows PC compatible

R3509 80GB

\$149

RENTSMART

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PLEASE NOTE:

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MAXTOR ONETOUCH II SMALL BUSINESS EDITION SERVER BACK UP - 200GB NATIVE / 300GB COMPRESSED^A

SIMPLE BACKUP FOR A SMALL BUSINESS SERVER

Designed for the small business, the Maxtor OneTouch II, Small Business Edition installs easily and includes a simple wizard interface for setting up unattended, automated backup schedules, drive management, security and backup settings, and file restoration.

Specifically developed for the small business server, comprehensive backups include operating system, settings, updates, applications, databases, address books, emails, documents and even open files!

You can even receive status updates via email or a simple desktop icon, and know that your backup is working - wherever you are.

^A Compression assumes 3:2 compression ratio. Actual compression may vary dependent on type of data.



Rent* \$8.95/wk

S4043 200GB

\$799

MAXTOR SHARED STORAGE DEVICE



- 2 USB ports let you add shared network printers or external storage
- Access files from multiple PCs simultaneously
- You can set access privileges and keep selected folders private
- With Maxtor exclusive Drag and Sort™ technology, you can instantly organise files by dragging them from your desktop PC to the Maxtor Shared Storage Drive
- With its sleek, anodised aluminium shell and compact size, the Maxtor Shared Storage Drive easily fits anywhere in your home or small office
- 1 year warranty

MAXTOR ONETOUCH II™ - SMART STORAGE WITH PUSH-BUTTON BACKUP



Just press the button and your files are backed up in one simple step. Faster than CD. Faster than a floppy. Faster than removable cartridge systems. Space for your photos, videos, graphics, music, documents and more. It connects to FireWire or USB ports on a PC or Mac. It backs up with the Maxtor OneTouch™ button or runs automated backups using the included software, Dantz® Retrospect® Express. And you can customise the button to launch any application. Powerful, yet simple backup. Fast, flexible, huge capacity.

R3323 100GB (USB 2.0)

\$229

R3322 200GB (USB 2.0 + FIREWIRE)

\$349

Q3145 250GB (USB 2.0 + FIREWIRE)

\$399

Q3146 300GB (USB 2.0 + FIREWIRE)

\$449

R7907 200GB (USB 2.0)

\$369

Q1270 300GB (USB 2.0)

\$489

STORE YOUR WORLD IN OURS

INTRODUCING THE SANSA E100 SERIES MP3 PLAYERS

Sansa e100 Series MP3 players provide high-quality digital music playback with sophisticated navigation and expandable memory at an affordable price. You can add up to 1GB of additional storage space with the SD slot for more MP3, WMA (including secure WMA content), and audible audio file formats.

FEATURES:

- Plays MP3, WMA (including secure WMA content), audible audio file formats
- Digital FM tuner with 20 preset stations
- New custom navigation allows sorting songs by artist, album, song title, genre, year, date loaded, and more
- Can be used as an external storage device for data store and transfer
- Enhanced sound fidelity with SRS WOW
- Mass storage compliant, no drivers required
- Up to 17 hours continuous playback using one AAA battery*
- Indigo backlit multi-line LCD display with ID3 tag info



*Based on standard playback, 128kbps MP3 with SRS WOW in off mode.

S6834 SANSA e130 BLUE - 512MB

\$149

S6959 SANSA e140 SILVER - 1GB

\$225

SANDISK DIGITAL AUDIO PLAYER

A small, portable player that uses embedded flash memory instead of a rotating hard drive and plays for up to 15 continuous hours on a single AAA battery#.

The new Digital Audio Players combine crystal-clear sound with a sleek design and sport a three button/one-joystick design and easy-to navigate user interface. They feature MP3, Windows Media® file and Windows Media based DRM file playback, FM radio and voice recording and can double as a USB data storage device.

FEATURES:

- Plays MP3, WMA, and WMA DRM
- Digital FM tuner with 20 preset stations
- Voice recorder with built-in microphone
- Hi-Speed USB 2.0 port for fast and easy transfer of files
- Up to 15 hours continuous playback using one AAA battery (included)*
- Indigo backlit multi-line LCD display



R7171 RED 256MB \$109

R7172 BLUE 512MB \$149

R8753 SILVER 1GB \$225

*Approximate playback at 128kbps MP3, 64kbps WMA

SECURE DIGITAL COMPATIBLE WITH SANSA MP3 DEVICES

SANDISK SECURE DIGITAL CARDS



G3995	256MB	\$59
M3944	512MB	\$89
N7731	1GB	\$159

SANDISK ULTRA II SECURE DIGITAL CARDS



N5441	512MB	\$99
R3303	1GB	\$179

SANDISK MINI SECURE DIGITAL CARDS



R0507	256MB	\$55
R0508	512MB	\$85
R9345	1GB	\$155

SANDISK TRANSFLASH



R9398	256MB	\$55
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REMOVABLE DATA STORAGE AND SOLUTIONS

IMATION DISC STAKKA™



- Perfect for business, studio and home use, with the Disc Stakka you need never waste time searching for a disk again
- Stores, protects and retrieves up to 100 of your favourite CDs or DVDs
- Fully motorised disc insert and eject helps protect your valuable discs
- Simple to set up, linking to your computer via a single USB cable.
- Supplied with powerful OpdTracker Disc Management Software - use to capture disc content, and then search an entire database of stored discs by title, keyword, directory or file name

M4871

\$185

IMATION DVD-R

8x 4.76GB JEWEL CASE 10 + BONUS 2



S6842

\$13

PLEASE NOTE:

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IMATION SNAP AND WIN COMPETITION

1st Prizes:

3 x NEC LCD Televisions

2nd Prizes:

3 x Canon Digital Cameras and Photo Printers

3rd Prizes:

3 x Imation Disc Stakkas

How to enter:

- 1• Purchase any Imation product
- 2• Go to www.imation.com.au
- 3• Complete the online entry form and attach a photo of your favourite holiday, funniest pet or cutest kid.

You must retain your receipt to claim prize. Competition closes 5pm AEST on 30/09/05. Terms and conditions apply. See www.imation.com.au/snapandwin/terms.htm

IMATION CD-R

52X 700MB 80MIN JEWEL CASE 10 + BONUS 2



S6844

\$9

IMATION DVD+R

8X 4.76GB JEWEL CASE 10 + BONUS 2



S6843

\$13

IMATION CD-RW

4X 700MB 80MIN JEWEL CASE 10 + BONUS 2



S6845

\$16

NEW ForceField™

Introducing Imation CD and DVD media with ForceField Protective Coating. These new discs feature a unique layer of protection that helps guard your CDs and DVDs from almost everything that everyday life can dish out. Fingerprints, scuffs, static charges that can attract dust, even most scratches are no match for ForceField coating. You can use these discs without worrying about losing your precious memories or valuable data.

IMATION CD-R

ForceField 52X 10 SLIM JEWEL CASE



S3986

\$10

IMATION CD-R

ForceField 52X 30 PACK SPINDLE



S2663

\$26



CD/DVD PRODUCTION

BURN ONLY

COPYSMARTBLAST DVD DUPLICATORS

evocept .iii

- Burn discs fast with these speedy stand alone duplicators
- Up to 16x DVD with DL support
- Ranging from 3 to 7 drives simultaneously burning
- Built-in 120GB hard disk with new USB 2.0 PC connection for image management

BURN & PRINT

360i DUPLICATE PRINTER



RIMAGE™

- Totally automated and easy to install and use
- One DVD/CD burning drive & 4800dpi printer
- 25 disc capacity
- Powerful, intuitive wizard based software
- World class Rimage quality

DISC SHREDDER

PRIMERA
TECHNOLOGY, INC.

DS360 DISC SHREDDER

Shred and Destroy CDs and DVDs!

- Heavy duty
- Auto start/stop & reverse
- Easy to empty wastebasket
- Shreds CDs, DVDs, credit cards and folded paper

S3475

\$199

SPIN CD/DVD



evocept .iii

Direct to disc printing that's fast, easy and inexpensive

- Single colour thermal printer
- Prints direct to disc
- Unique 4 x 90° rotation function supports 4 separate print areas
- Ideal for simple text and logos

M5461

\$179

RENTSMART

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PLEASE NOTE:

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CD only models also available. Rent* \$15.68/wk

Q2085 3 DVD±R \$1,399

Rent* \$21.28/wk

Q2086 5 DVD±R \$1,899

Rent* \$24.64/wk

Q2087 7 DVD±R \$2,199

Rent* \$40.82/wk

S1146 1 DVD±R DRIVE \$3,999

BURN & PRINT

BRAVOPRO DUPLICATE PRINTER

PRIMERA
TECHNOLOGY, INC.BravoPro™
DISC PUBLISHERRIMAGE 2000i CD AND DVD
PUBLISHERS

RIMAGE™



- 2 drives CD or DVD
- Totally automated and hands free
- 100 disc capacity
- Incorporates 480i CD/DVD Printer
- Duplication and Publishing capability
- Network software supports PC or Mac clients
- Up to 2 units on one PC
- Plug and play

Rent* \$48.90/wk

Rent* \$53.51/wk

Q9576 2 CD-R \$5,299

Rent* \$55.36/wk

N2212 2 CD-R \$5,799

Rent* \$59.97/wk

Q9577 2 DVD±R \$5,999

N2213 2 DVD±R \$6,499

THE VALUE FRONTIER

**KYOCERA FS-1000/FS1010 -
TONER KIT**

A4532 **\$135**
**KYOCERA FS-3830N TONER
20,000 YIELD**

N6559 **\$169**
**KYOCERA FS-1920 TK-55
TONER 15,000 PAGE YIELD**

N2204 **\$165**
**KYOCERA FS-C5016N BLACK
TONER 8000 PAGES**

L5849 **\$109**
**KYOCERA FS-C5016N CYAN
TONER 8000 PAGES**

L5850 **\$206**
**KYOCERA FS-C5016N
MAGENTA TONER 8000 PAGES**

L5851 **\$206**
**KYOCERA FS-C5016N YELLOW
TONER 8000 PAGES**

L5852 **\$206**
**KYOCERA FS-C5016N COLOUR
KIT WITH BONUS BLACK
TONER**

L5853 **\$599**

MONO LASER PRINTER - FS-920

- Up to 18ppm A4
- Power PC 405 266MHz
- 600 x 600 dpi
- 32MB (Maximum: 288MB)
- 11 seconds to print first page
- A4, B5, A5, letter, legal paper sizes
- 250 sheet input cassette
- Parallel + USB 2.0
- 15,000 pages per month maximum duty cycle
- Return to base or KyoCare Exchange, 1 year or 100,000 pages whichever occurs first

R3899

\$399
MONO DUPLEX PRINTER - FS-1020D

- Up to 20ppm A4
- Power PC 405 266MHz
- 600 x 600 dpi
- 16MB RAM (Maximum: 272MB)
- 10 seconds to print first page
- A4, B5, letter, legal paper sizes
- 50 + 250 sheet input
- Parallel + full speed USB 2.0
- 15,000 pages per month maximum duty cycle
- Standard automatic duplex unit
- 2 year return to base warranty

N2191

\$545
MONO LASER MFP - FS-1118

- Up to 18ppm A4
- 9.5 seconds to print first page
- Standard 250 sheet paper cassette + 50 sheet MPT
- Automatic document feeder
- Additional 250 sheet paper cassette
- Copying: up to 18ppm digital copier
- Fax system including network fax
- Standard Interfaces: Ethernet 10/100 Base-TX
- 2 year on-site warranty

Rent* \$11.19/wk

S5359

\$999
MONO LASER PRINTER - FS-3830N

- Up to 33ppm A4
- PC 750 CX/300MHz
- 600 x 600 dpi
- 96MB RAM (Maximum: 576MB)
- 11.5 seconds to print first page
- A4, B5, A5, letter, legal paper sizes
- 100 + 500 sheet input
- Fast Ethernet 10/100 Base TX + Parallel + Hi-speed USB 2.0
- 175,000 pages per month maximum duty cycle
- 2 year on site warranty

Rent* \$17.69/wk

N6150

\$1,579
COLOUR LASER PRINTER - FS-C5016N

- Up to 16ppm A4
- Power PC 750 CXe/400MHz
- 600 x 600 dpi
- 96MB RAM (Maximum: 608MB)
- 16 seconds to print first page
- A4, B5, A5, letter, legal paper sizes
- 100 + 500 Sheet input
- Network + Parallel + Full Speed USB 2.0
- 85,000 pages per month maximum duty cycle
- 2 year on site warranty

Rent* \$29.03/wk

L5843

\$2,717
***RENTSMART**

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PLEASE NOTE:

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LEADERS IN VISUAL DISPLAY TECHNOLOGY

17" LCD MONITOR



ACCUSYNC LCD72V

- Native Resolution: 1280 x 1024
- Response time: 16ms
- Analogue input
- Contrast ratio: 450:1
- Thin frame design

Q2328 WHITE

\$419

Q2329 BLACK

\$419

17" LCD MONITOR



MULTISYNC LCD1770NX

- Native Resolution: 1280 x 1024
- Response time: 12ms
- Analogue and digital inputs
- Contrast ratio: 500:1
- Thin frame design

Q6941 WHITE

\$537

Q6942 BLACK

\$537

19" LCD MONITOR



ACCUSYNC LCD92V

- Native Resolution: 1280 x 1024
- Response time: 16ms
- Analogue input
- Wide viewing angle
- Thin frame design

Rent* \$7.38/wk

Q5545 WHITE

\$659

Q5546 BLACK

\$659

19" LCD MONITOR



MULTISYNC LCD1970NX

- Native Resolution: 1280 x 1024
- Response time: 25ms
- Analogue and digital inputs
- Wide viewing angle
- Thin frame design

Rent* \$9.78/wk

Q2330 WHITE

\$873

Q2331 BLACK

\$873

VT47G ULTRA PORTABLE PROJECTOR



- 1500 ANSI lumens
- SVGA Resolution
- Quiet operations (28dB in Eco Mode)
- Lamp life 2000 hours
- Integrated speaker
- Compact 2.9kg

Rent* \$14.78/wk

N9298

\$1,319

LT180G DLP PROJECTOR



- 2000 ANSI Lumens
- XGA Resolution
- 1000:1 Contrast Ratio
- Component video input terminal
- Compact 2.9kg

Rent* \$28.62/wk

S1982

\$2,679

VT670G ULTRA PORTABLE PROJECTOR



- 2100 ANSI lumens
- XGA Resolution
- Lamp life 2000 hours
- Security functions
- Compact 2.9kg

Rent* \$28.73/wk

P5886

\$2,689

*RENTSMART

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VISUAL DISPLAY OF CHOICE

SAMSUNG EXTERNAL DOUBLE-LAYER DVD±R/RW DRIVE - USB 2.0



Whether it be a mountain of music, a home movie of epic proportions or a lifetime of digital memories, the sky's the limit with Samsung's 4x speed dual layer DVD burner.

- Interface: USB 2.0
- DVD+R: write 16x, read 12x
- Double Layer: write 8x, read 8x
- Writemaster Technology:
- O.P.C. Technology
- Tilt Actuator Compensation Technology
- SAT (Speed Adjustment Technology)
- A.B.S. Technology
- Magic Speed

S2404

\$169***RENTSMART**

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PLEASE NOTE:

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17" TFT MONITOR


NEW!
4MS
RESPONSE
TIME
730BF

- Pixel pitch: 0.264 mm
- Contrast ratio: 600:1
- Viewing Angle (H/V): 160°/160°
- Response Time: 4ms (Grey to Grey)
- Interface: Analogue / Digital
- Maximum resolution: 1280x1024
- 3 year on site exchange^A

S6830 BLACK

\$529

19" TFT MONITOR


NEW!
4MS
RESPONSE
TIME
930BF

- Pixel pitch: 0.294 mm
- Contrast ratio: 700:1
- Viewing Angle (H/V): 160°/160°
- Response Time: 4ms (Grey to Grey)
- Interface: Analogue / Digital
- Maximum resolution: 1280x1024
- 3 year on site exchange and zero dead pixel policy^A

Rent* \$8.17/wk

S6833 BLACK

\$729

17" TFT MONITOR


12MS
RESPONSE
TIME
710N

- Pixel pitch: 0.264mm
- Contrast ratio: 600:1
- Viewing angle (H/V): 160°/160°
- Response time: 12ms
- Interface: Analogue
- Maximum Resolution: 1280x1024
- 3 year on site exchange^A

S7070 SILVER

\$369

19" TFT MONITOR


12MS
RESPONSE
TIME
913V

- Pixel pitch: 0.294mm
- Contrast ratio: 600:1
- Viewing angle (H/V): 160°/150°
- Response time: 12ms
- Interface: Analogue
- Maximum Resolution: 1280x1024
- 3 year on site exchange and zero dead pixel policy^A

S0810 SILVER

\$529

S5228 BLACK

\$369

S4224 BLACK

\$529

^APlease contact Samsung Electronics Australia on 1300 362 603 or email: monitor.service@samsung.com for full Terms & Conditions.

ALL PRINTERS
SUPPLIED WITH
BONUS
PRINTER CABLE

SAMSUNG

harristechnology



Printers

QUALITY AND INNOVATION, NO RISK



MONO LASER PRINTER

SAMSUNG ML-1740

- Speed (ppm): up to 16ppm/A4, up to 17ppm/letter
- Resolution 600 x 600 dpi
- Maximum Paper Size: 216mm x 356mm
- Minimum Paper Size: 76mm x 127mm

P2581

\$199



MONO LASER MFP

SCX-4216F

- 16ppm mono laser multifunction
- Printer/Copier/Colour Scanner/Fax
- Auto document feeder
- 33.6 kbps fax
- Telstra Duet compatible
- 250 sheet tray
- Windows only
- USB & IEEE1284 connectivity

J2137

\$399



COLOUR LASER PRINTER

SAMSUNG CLP-510

- 6ppm colour/24ppm mono duplex laser
- Memory 64MB (Max. 192MB)
- Resolution up to 1200 x 1200 dpi effective output
- Processor (CPU) Samsung SPGPm
- Emulation SPL-C (Samsung Printer Language Colour)
- 250 sheet tray, 100 sheet MPF, Windows only, USB 2.0
- 3 year onsite warranty

Rent* \$7.49/wk

S2190

\$669



COLOUR LASER PRINTER

SAMSUNG CLP-550N

- 3 year manufacturer onsite warranty
- Speed: 5ppm (colour), 20ppm (mono)
- Resolution: 1200 dpi max
- RAM (Standard): 128MB
- 10/100BaseTX (ethernet) network card
- Auto-duplexing (the ability to print on both sides of a sheet of paper)
- 250 sheet paper cassette, plus a 100 sheet multipurpose feeder

Rent* \$10.07/wk

P9392

\$899

SAMSUNG TONERS

SAMSUNG TONER FOR ML-1740

3000 PAGE YIELD

J2380

\$98

SAMSUNG TONER FOR SCX-4216F MFC MACHINE

J9653

\$99

SAMSUNG CLP-510 7,000 PAGE BLACK TONER CARTRIDGES

S2534

\$143

SAMSUNG CLP-500 + CLP 550N BLACK TONER 7000 PAGE YIELD

M9755

\$139

SAMSUNG CLP-500

AND CLP-550N ADDITIONAL 500 SHEET PAPER TRAY

Q1877

\$ 249

SAMSUNG CLP 550 + CLP 550N + CLP 510 CYAN TONER

M9756

\$155

SAMSUNG CLP 550 + CLP 550N + CLP 510 MAGENTA TONER

M9757

\$155

SAMSUNG CLP 550 + CLP 550N + CLP 510 YELLOW TONER

M9758

\$155

*RENTSMART

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ULTRA PORTABLE PROJECTORS

DIGITAL STILL
CAMERAS

Cyber-shot

MEMORY STICK PRO



DSC90S



- 4.1 megapixel
- 3x optical zoom
- MPEG movie VX

S0761

\$429

DSCW5S



- 5.1 megapixel
- 2.5" colour LCD
- Carl zeiss lens

Rent* \$6.49/wk

R8761

\$579

DSCW7S



- 7.2 megapixel
- 2.5" colour LCD
- Carl zeiss lens

Rent* \$8.73/wk

S1280

\$779

RENTSMART

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BRIGHT IMAGES

GENTLE ON THE EYES

NATURAL COLOURS

- 2 years warranty
- Integrated Speakers

- Password Security Feature
- Ceiling Mountable

- Remote Control supplied
- Carry Case supplied

VPLDS100



BONUS
ITEMS
See table
below

- 1200 ANSI lumens
- Vertical keystone correction
- Hi definition capable
- Screen size up to 300"

Rent* \$17.14/wk

P9989

\$1,530

VPLES2



BONUS
ITEMS
See table
below

- 1500 ANSI lumens
- Long lamp life up to 4000 hours
- Short throw lens
- 6 picture mode settings

Rent* \$20.72/wk

Q9803

\$1,849

VPLCS7



BONUS
ITEMS
See table
below

- 1800 ANSI lumens
- Advanced auto set-up
- Hi definition capable
- Screen size up to 300"

Rent* \$24.84/wk

P9962

\$2,325

VPLEX1



BONUS
ITEMS
See table
below

- 1500 ANSI lumens
- XGA resolution
- Intelligent auto set-up
- Compact 2.7kg

Rent* \$31.46/wk

J9934

\$2,990

VPLCX70



BONUS
ITEMS
See table
below

- 2000 ANSI lumens
- XGA (1024 x 768) resolution
- Intelligent auto set-up
- Digital zoom function

Rent* \$36.41/wk

P4289

\$3,495

VPLCX76 WIRELESS



BONUS
ITEMS
See table
below

- 2500 ANSI lumens
- XGA (1024 x 768) resolution
- Airshot II wireless connection
- Memory stick slot

Rent* \$43.85/wk

S8905

\$4,635

Projector	Bonus Option 1	OR	Bonus Option 2	OR	Bonus Option 3	OR Bonus Option 4
VPL DS100	2 x CML \$50 vouchers		1 x External DVD Burner			3rd year extended warranty
VPL ES2	3 x CML \$50 vouchers		1 x External DVD Burner		1 x PS2 Console	3rd year extended warranty
VPL EX1	1 x Home DVD Recorder					3rd year extended warranty
VPL CS7	4 x CML \$50 vouchers		1 x External DVD Burner		1 x PS2 Console + Presentation Tool	3rd year extended warranty
VPL CX70	1 x Home DVD Recorder + Presentation Tool					3rd year extended warranty
VPL CX76	1 x Home DVD Recorder + Presentation Tool		5.1MP Digital Camera			3rd year extended warranty

*Bonus items are valid for purchases from 01/07/05 - 31/08/05 and can be redeemed at www.sony.com.au/projectorbonus. CML (Coles Myer Limited) vouchers not redeemable at Harris Technology.



HP DIGITAL PROJECTORS

VP6325 DIGITAL PROJECTOR

- Smarter versatility and portability with integrated handle
- Simple-to-use. Auto detects optimal setting for data, graphics or video
- 4000 hours lamp life
- DLP™ technology, 2000 lumens, XGA resolution, 2500:1 contrast ratio for outstanding image quality
- Weight: 3.5kg
- 2 year lamp warranty
- 3 year projector warranty



Rent* \$33.66/wk

S3312

\$3,199

MP3222 DIGITAL PROJECTOR

- Quality solution that provides outstanding price-to performance.
- Featured packed 1.7 kilogram in weight
- 5-segment colour wheel for business and home theatre use
- 3000 hour lamp life in economy mode
- Carry bag included
- DLP™ technology, 2000 lumens, XGA resolution, 2000:1 contrast ratio for outstanding image quality
- 3 year projector warranty



Rent* \$30.50/wk

P7947

\$2,899

MP3135W DIGITAL PROJECTOR

- Wireless connectivity or present powerpoint slides straight from a USB key.
- PC-free presenting using storage memory card
- Unique space saving tower design
- 5-segment colour wheel for business and home theatre use
- Carry bag included
- DLP™ technology, 1800 lumens, XGA resolution, 2000:1 contrast ratio for outstanding image quality
- Weight: 1.7kg
- 3 year projector warranty



Rent* \$45.92/wk

S3308

\$4,499

VP6315



FEATURES:

- Smarter versatility and portability with integrated handle
- Simple-to-use. Auto detects optimal setting for data, graphics or video
- 4000 hours lamp life
- DLP™ technology, 2000 lumens, XGA resolution, 2000:1 contrast ratio for outstanding image quality
- Weight: 3.5kg
- 2 year lamp warranty
- 3 year projector warranty

Rent* \$22.40/wk

S3311

\$1,999

XP8010



FEATURES:

- DLP™ Technology
- 2600 Lumens in brightness
- True XGA (1024 x 768) resolution
- Perfect for ceiling mounted applications
- High connectivity
- 3 year projector warranty

Rent* \$55.36/wk

M0914

\$5,999

*RENTSMART

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MONO LASERJET PRINTER SERIES

HP LASERJET 4345MFP SERIES



IDEAL FOR SMB PRINTER, SCANNER, COPIER

- Print: up to 43ppm in A4
- First page out: 10 seconds
- Resolution: 1200 dpi
- Easy to use touch screen control panel
- Scan: up to 45cpm (letter) / 43cpm (A4)
- Copy: resolution enhanced 600 x 600 dpi

HP LJ 4345MFP Rent* \$41.84/wk
R0332 **\$4,099**

HP LASERJET 4250 SERIES



- Up to 43ppm in A4
- Resolution: 1200 dpi
- 500 sheet tray & 100 sheet multi-purpose tray
- Monochrome laser
- Two open industry-standard CompactFlash slots

HP LJ 4250 Rent* \$19.04/wk
Q3919 **\$1,699**

HP LJ 4250N Rent* \$23.67/wk

Q2900 **\$2,289**

HP LJ 4250TN Rent* \$27.91/wk

Q2894 **\$2,699**

HP LJ 4250DTN Rent* \$34.18/wk

Q2890 **\$3,249**

*RENTSMART

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HP LASERJET 1320 SERIES



Fast desktop laser printer ideal for small business workgroup or SOHO users

- Speed: up to 21ppm in A4
- Resolution: 1200 dpi
- First page out: 8.5 seconds
- 16MB RAM

HP LJ 1320 Rent* \$7.83/wk

P9319 **\$699**

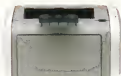
HP LJ 1320N Rent* \$9.04/wk

P9320 **\$839**

HP LJ 1320TN Rent* \$11.08/wk

P9321 **\$989**

LASERJET 1020



- Speed: 15ppm
- First page out: 10 seconds
- Resolution: 1200 dpi
- Duty cycle: 5000 (pages/month)
- Connectivity: USB 2.0 high speed

R9102 **\$229**

LASERJET 1022 & 1022N



- Speed: 18ppm
- First page out: 8 seconds
- Resolution: 1200 dpi
- Duty cycle: 8000 (pages/month)
- Connectivity: USB 2.0 high speed, 10/100 network solution (for the 1022N only)

HP LJ 1022

R9103 **\$379**

HP LJ 1022N

R9104 **\$549**

HP LASERJET 3030 SERIES ALL-IN-ONE



The space-saving LaserJet all-in-one for business

- Speed: up to 15ppm (letter) and up to 14ppm (A4)
- Resolution: 1200 dpi
- First page out: 10 seconds
- 32MB RAM
- FastRes 1200
- Copier: 14cpm
- Fax: 33.6kbps fax modem
- Scanner: 600 x 600 dpi optical
- Connectivity: USB & Parallel

M7638 Rent* \$7.83/wk

\$699

LASERJET 2430 SERIES



- Speed: 33ppm
- First page out: 10 seconds

HP LJ 2430T Rent* \$18.48/wk

Q2891 **\$1,649**

HP LJ 2430TN Rent* \$24.18/wk

Q2892 **\$2,158**

HP LJ 2430DTN Rent* \$23.67/wk

Q2893 **\$2,289**

ALL PRINTERS
SUPPLIED WITH
BONUS
PRINTER CABLE



harristech technology



Printers

HP PRINTERS

HP COLOR LASERJET MFP 2800 SERIES



- Network ready Color LaserJet All in One.
- Print, scan, copy and digital card slot
- Fast laser printing 19ppm mono and 4ppm colour
- High quality printing with Image Ret2400
- 1200 dpi resolution scanner

HP 2840

- Super G3 Fax V.34 fax modem (up to 33Kbps)
- 2 Card slots and fax

Rent* \$16.35/wk

S1223 HP Color 2820 **\$1,459**

Rent* \$19.60/wk

S1217 HP Color 2840 **\$1,749**

HP COLOR LASERJET 4650 SERIES



- Up to 21ppm colour and black & white
- 160MB RAM
- 600 x 600 dpi with HP ImageREt 3600
- 100 sheet multipurpose tray and 500 sheet input tray
- 533 MHz RISC processor
- 85,000 pages per month

Rent* \$34.78/wk

N5949 HP Color LJ 4650 **\$3,339**

Rent* \$40.71/wk

N6043 HP Color LJ 4650DN **\$3,988**

Rent* \$50.47/wk

N6044 HP Color LJ 4650DTN **\$5,469**

HP COLOR LASERJET 2600N PRINTER



- Fast 8ppm colour laser printing
- High quality, reliable and quiet entry level in line printing
- Vibrant quality colour printing with ImageRET2400
- Standard 10/100 network printing
- Standard 375 page input for versatile printing.
- Small true personal desktop design

Rent* \$8.39/wk

S2505 HP Color LJ 2600N **\$749**

HP COLOR LASERJET 3550 SERIES



- Up to 16ppm colour and black & white
- 600 x 600 dpi with HP ImageREt 3600
- 64MB RAM
- 533 MHz RISC processor
- 45,000 pages per month

Rent* \$19.04/wk

Q3133 HP Color LJ 3550 **\$1,699**

Rent* \$23.03/wk

Q3134 HP Color LJ 3550N **\$2,129**

HP DJ 450 CBI



Compact, high-performance,
colour mobile printer for the
on-the-go professional

- Up to 9ppm for black & up to 8ppm for colour
- 1200 dpi black
- USB
- Up to 4800 x 1200 optimised dpi colour
- 4MB ROM/16MB RAM
- USB, IR, centronics, CF card slot

R8990

\$435

HP BUSINESS INKJET PRINTER 1000



- Quality business printing at and affordable price
- Fast printing with up to 23ppm mono and 18ppm colour
- Quality printing with up to 4800 optimised dpi
- High capacity (1750 pages 5% coverage) individual cartridges
- High 6250 Duty Cycle

S2344

\$269

*RENTSMART

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PLEASE NOTE:

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HP DESKJET & OFFICEJET SERIES

HP DESKJET 3745



Compact and reliable colour inkjet printer ideal for home use

- Up to 4800 optimised dpi
- Up to 1200 x 1200 dpi black
- Up to 10ppm black
- Up to 14ppm in colour
- 80-sheet input tray, 50-sheet output tray
- A6 borderless

Q1872

\$75

HP DESKJET 4255 ALL-IN-ONE



Ultra compact all-in-one: print, fax, scan, copy and phone in one small machine

- Up to 17ppm in black, up to 1200 x 1200 dpi
- Up to 12ppm in colour, up to 4800 x 1200 optimised dpi colour & 1200-input dpi
- Scan quality up to 36-bit colour
- Fax transmission 33.6 Kbps

NB513

\$189***RENTSMART**

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HP PSC 1610 ALL-IN-ONE



- Print: up to 23ppm black, 19ppm colour, up to 4800 x 1200 optimised dpi
- Scan: up to 1200 x 1400 dpi
- Copy: 600 dpi mono, up to 1200 x 4800 dpi colour
- View, edit and print photos with or without a PC with PictBridge port
- Digital media card slots

HP PSC 2610 ALL-IN-ONE



- Print: up to 30/20 ppm, black/colour, up to 4800 optimised dpi
- Scan: up to 2400 x 4800 optical resolution, 48-bit colour
- Copy: up to 4800 x 1200 dpi colour, up to 600 x 1200 dpi black
- Reduce/enlarge: 25 to 400%

HP OFFICEJET 2710 ALL-IN-ONE



- Print: 30ppm black, 20ppm colour, up to 4800 optimised dpi
- Fax: 33.6kbps fax modem
- Scan: up to 2400 x 4800 optical resolution, 48-bit colour
- Copy: up to 30ppm black, 20ppm colour
- Borderless A4 photo printing
- Wired ethernet and wireless 802.11g networking built-in

R5058

\$185

Q2902

\$359

Q2903

\$459

HP DESKJET 6540



- Up to 4800 optimised dpi
- Up to 30ppm in black
- Up to 20ppm in colour
- Automatic two sided printing
- Front USB port for walk-up laptop printing
- One-touch print quality selector, print cancel button and ink status display
- Borderless A4 photo printing

HP OFFICEJET 7410 ALL-IN-ONE



- Print: up to 30ppm black, 20ppm colour
- Fax: 33.6kbps fax modem
- Scan: up to 2400 x 4800 optical resolution, 48-bit colour
- Copy: 30ppm black, 20ppm colour
- Wired ethernet and wireless 802.11g networking built-in
- Automatic two-sided printing and 50 sheet ADF
- 400 sheet total paper capacity

Rent* \$8.38/wk

P9614

\$189

Q2905

\$739

HP DESIGNJET LARGE FORMAT PRINTERS

HP DESIGNJET 130 SERIES



HP Viverra Inks for fade-resistant photo quality
From postcards to 24-inch/A1+ and larger on roll
Fast printing and up-to-date connectivity

DESIGNJET 130NR

Automatic roll feed & cutter for 24" wide rolls
Rent* \$29.05/wk

N7837 DesignJet 130 **\$2,719**

Rent* \$43.88/wk

N7170 DesignJet 130NR **\$4,299**

Valid for purchases invoiced from 1st July - 31st August 2005. Redemption from HP via claim form available on purchase.
Please visit www.hp.com.au/freeprint for your FREE HP DesignJet Large Format Print Sample on DesignJet page.

HP DESIGNJET 90 SERIES



- Affordable, six-colour, fade-resistant photo quality
- Accurate colour consistency from print to print
- From postcards to A2+/C+, and larger on roll
- Fast printing and easy to use

S4474 Roll feed unit **\$350**

Rent* \$24.64/wk

S4243 DesignJet 90 **\$2,199**

HP DESIGNJET 70 PRINTER



- Sharp detail, crisp lines and text
- Rich, vibrant colour
- Save valuable time and money
- Full range of media up to A2+/C+

Rent* \$19.94/wk

S4249 **\$1,779**

*RENTSMART

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HP LASERJET & INKJET CONSUMABLES

HP LASERJET PRINT CARTRIDGE, LJ 1010 PRINTER SERIES



Yield 2,000 based on 5% coverage
Q2612A

L0381 **\$95**

HP 51645A - NO 45 BLACK INKJET CARTRIDGE



51645AA
22643 **\$44**

HP C6656AA - NO 56 BLACK INKJET CARTRIDGE



C6656AA
F9434 **\$30**

HP Q2610A LASERJET 2300 6000 PAGES TONER



Q2610A
J0537 **\$184**

HP C6578DA - NO 78 TRI-COLOR INKJET PRINT CARTRIDGE



C6578DA
86183 **\$47**

HP 57 TRI-COLOR INKJET CARTRIDGE AP



C6657AA
F9886 **\$49**

HP 96 AP BLACK PRINT CARTRIDGE



C8767WA

Q1677 **\$49**

HP C5010DA - NO 14 TRI-COLOR INK CARTRIDGE



C5010DA

J6262 **\$53**

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FAX + MFP

CANON PRINTERS

Canon

CANON PIXMA MP760

BLACK INK CARTRIDGE
For MP760 BCI-6BK

C3420 **\$22**

CYAN INK CARTRIDGE
For MP760 BCI-6C

C3424 **\$22**

MAGNETA INK CARTRIDGE
For MP760 BCI-6M

C3426 **\$22**

YELLOW INK CARTRIDGE
For MP760 BCI-6Y

C3428 **\$22**

COLOUR PRINTER/COPIER/SCANNER

- All colour function: printer, copier and scanner
- 2 picolitre FINE (Full-photolithography Inkjet Nozzle Engineering) print-head technology
- Outstanding print quality with up to 4800 x 1200 dpi
- ContrastPLUS 5 colour individual ink system for improved image contrast and cost-savings
- Print and copy up to 25ppm black and 17ppm colour
- Scan photos up to 2400 x 4800 dpi (9600 dpi optimised)
- Built-in Film Adaptor Unit (FAU) allows you to scan up to 6 negatives or 4 mounted slides
- Dual paper path with Auto Sheet Feeder (ASF) and front cassette – perfect for easy switching between plain and photo paper, also enables a huge plain paper capacity up to 300 sheets and offers space-saving configuration



CAMERA NOT INCLUDED

R7268

\$429

BROTHER

At your side™
brother

BLACK INK CARTRIDGE
For MFC - 620CN (400 page yield)

Q1657 **\$29**

CYAN INK CARTRIDGE
For MFC - 620CN (400 page yield)

Q1659 **\$15**

MAGNETA INK CARTRIDGE
For MFC - 620CN (400 page yield)

Q1660 **\$15**

YELLOW INK CARTRIDGE
For MFC - 620CN (400 page yield)

Q1661 **\$15**

PLEASE NOTE:

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Not all items stocked in store but available for pick-up/delivery.



FAX 2820 LASER MACHINE

- Black & white laser print technology
- Black & white faxing capability
- Fax modem speed 14.4Kbps fax modem
- Best transmission speed (sec) approximately 6 seconds per page
- Maximum automatic document feeder capacity 20 page
- 250 sheet input capacity
- Standard memory (MB) 8MB
- Fax page memory up to 500 pages

S1320

\$349

MFC-620CN

- Brother MFC-620CN 8 in 1 Inkjet flatbed network MFC with PhotoCapture Centre
- Colour printer, 20ppm mono, 15ppm colour
- 1200 dpi x 6000 dpi optimised
- Up to 100 sheet capacity

Q1625

\$349

ALL PRINTERS
SUPPLIED WITH
BONUS
PRINTER CABLE

EPSON®

harris technology



Printers

EPSON PRINTERS

COLOUR MFP



COLOUR LASER AL-CX11N MFP



EPSON RX700

High speed printing – up to 20ppm black text
Scan directly from 35mm film or slides to digital images
Bluetooth compatible connection for maximum versatility
Individual Intelligent ink cartridge one for each of 6 colours

Rent* \$7.27/wk

EPSON AL-CX11N

- High speed printing at up to 25ppm mono and 5ppm colour
- Optical scanning resolution up to an enhanced 9600 dpi
- Epson's wrap transfer system for added speed and accuracy of toner placement
- Epson AcuBrite Toner for vibrant and detailed prints

Rent* \$16.80/wk

S3301

\$649

S6829

\$1,499

COLOUR LASER



COLOUR LASER



EPSON AL C3000N

High speed printing at 24 pages-per-minute in both colour and monochrome
Up to 24ppm in full colour
Resolution: 600 dpi (2400 dpi with Epson RIT)
Integrated 10/100 Base TX Network Interface
Duplexing: Standard
600 page input standard

Rent* \$22.10/wk

EPSON AL C1100

The Epson AcuLaser C1100 is the affordable colour and monochrome laser printer that delivers high speed, photo quality prints for small businesses and workgroups that require a compact and easy-to-use solution. The AcuLaser C1100 features the latest in Epson's toner technologies - AcuBrite- and a new wrap transfer system to produce outstanding results first time, every time.

Rent* \$8.17/wk

Q7725

\$1,972

Q7367

\$729

COLOUR LASER



PHOTO SCANNER



EPSON PERFECTION 4990

- 4800 x 9600 dpi optical resolution
- High optical density
- Windows and Macintosh drivers
- High speed - new moving carriage-type TPU, new lamps, faster film scanning (negative film)
- Productive - simultaneous scan of up to 24 35mm strip frames
- The ideal scanner for professional film scanning with Digital Ice dust and scratch removal for film and prints

Rent* \$8.95/wk

EPSON AL C4100

- Up to 24ppm in full colour
- 2400 dpi with Epson RIT
- Integrated 10/100 Base TX Network Interface
- Integrated duplex unit for two-sided printing!
- 600 page input standard

Rent* \$31.55/wk

L5869

\$2,999

R2909

\$799

EPSON PERFECTION



STYLUS PHOTO R2400

New to Epson photographic printing family is the Stylus Photo R2400 – the A3+ inkjet printer designed for fine art reproductions, commercial quality photographs and design proof printing. With an array of Epson-developed technologies including the new UltraChrome K3 Ink set and a 1" wide, multi layered piezo print head; unrivalled quality is the only result.

- New Epson UltraChrome K3 Ink with Matte Black (or Photo Black), Light Black and now Light, Light Black for outstanding greyscale balance
- 5760 optimised DPI using Epson's Resolution Performance Management (RPM) technology
- 1" wide multi-layered piezo print head for smooth, detailed and fast prints
- Epson's K3 Inks enable quick drying times and greater colour stabilisation

Rent* \$19.04/wk

S3206

\$1,699

*RENTSMART

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CHECK OUT LEXMARK'S WEBSITE FOR THEIR LATEST PROMOTIONS
**LEXMARK
TONER**
LEXMARK E SERIES

Lexmark E Series 2,500 page toner cartridge. Suits Lexmark E230, E232, E330 & E323n laser printers

P2866 **\$115**

**LEXMARK X215
3,200 PAGE TONER CARTRIDGE**

L5690 **\$105**

**LEXMARK C510
SERIES**

C510 High Yield Cyan Cartridge

N5852 **\$255**

C510 High Yield Magenta Cartridge

N5853 **\$255**

C510 High Yield Yellow Cartridge

N5854 **\$255**

C510 High Yield Black Cartridge

N5855 **\$179**

***RENTSMART**

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**AN EXCELLENT EVERY DAY
PRINTER**

LEXMARK E232

- Outstanding performance in a desktop laser
- 21ppm A4 mono laser printer
- 200MHz processor and 16MB RAM standard
- PCL6 emulation
- In-built 250 sheet paper drawer
- USB & parallel ports standard
- 2 year onsite exchange LexExpress warranty

Q2333

\$399

**HIGH QUALITY DESKTOP
PRINTER FOR ALL YOUR
COLOUR & MONO PRINTING**

LEXMARK C510

- 30ppm C510 & 8ppm colour laser
- 64MB expandable to 320MB
- 500MHz processor
- 2400 image quality resolution
- PostScript 3 & PCL6 emulation
- 250-sheet input expandable to 780-sheets
- 2 years next business day onsite warranty
- Put it on your network N4000e - M2857

\$265

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- Windows Print System
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P8495

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- Windows®, Macintosh® & Linux compatible
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S3256

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KONICA MINOLTA magicolor® 2430DL

Connect your digital camera directly to this printer



- Up to 20ppm mono, 5ppm colour
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- 2400 x 600 dpi resolution
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- 2 year on site warranty

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KONICA MINOLTA magicolor® 2450



- Up to 20ppm mono, 5ppm colour
- 10/100BaseTX Ethernet®, Parallel & USB 2.0 (high Speed) interfaces
- 9600 x 600 dpi resolution
- 200 sheets input standard / 700-sheets input maximum
- PostScript 3, PCL5, PCL6
- Direct Photo Print
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- Single pass solid ink



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P3268

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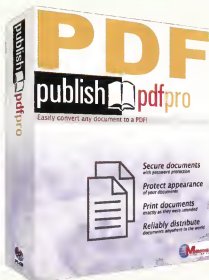
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Q3124 **\$159**

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ADOBE® CREATIVE SUITE 2



Adobe Creative Suite 2 Standard software, is a unified design environment that combines full new versions of Adobe Photoshop® CS2, Illustrator® CS2, and InDesign® CS2 software with new Version Cue® CS2, Adobe Bridge, and Adobe Stock Photos.

ADOBE® CREATIVE SUITE 2 STANDARD

R9487 FULL WIN **\$1,415**R9486 FULL MAC **\$1,415**R9496 UPGRADE WIN **\$588**R9497 UPGRADE MAC **\$588**

ADOBE PHOTOSHOP CS2

Adobe® Photoshop® CS2 software, the professional image-editing standard and leader of the Photoshop digital imaging line, delivers more of what you crave.



ADOBE ILLUSTRATOR CS2

Adobe® Illustrator® CS2 software gives you new creative freedom that lets you realise your ideas quickly and powerfully.



ADOBE INDESIGN CS2

InDesign CS2 delivers faster production workflows and a more fluid creative environment for designing and outputting professional page layouts.



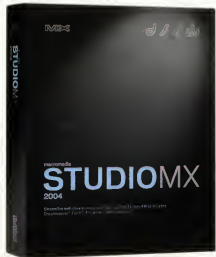
Adobe Creative Suite 2 Premium software combines full new versions of Adobe Photoshop®, Illustrator®, InDesign®, GoLive®, and Acrobat® Professional software with the enhanced Version Cue® file-version manager, the new Adobe Bridge file browser, new Adobe Stock Photos, and support for consistent colour and Adobe PDF file creation, allowing you to realise your ideas more efficiently than ever.

ADOBE® CREATIVE SUITE 2 PREMIUM

R9485 FULL WIN **\$1,835**R9484 FULL MAC **\$1,835**R9494 UPGRADE WIN **\$875**R9495 UPGRADE MAC **\$875**R9493 FULL WIN **\$999**R9492 FULL MAC **\$999**R9499 UPGRADE WIN **\$289**R9500 UPGRADE MAC **\$289**R9491 FULL WIN **\$879**R9490 FULL MAC **\$879**R9503 UPGRADE WIN **\$295**R9504 UPGRADE MAC **\$295**R9666 FULL WIN **\$1,235**R9667 FULL MAC **\$1,235**R9673 UPGRADE WIN **\$295**R9656 UPGRADE MAC **\$295**

EXPERIENCE MATTERS

MACROMEDIA® STUDIO MX 2004



Macromedia Studio MX 2004 integrates the leading professional tools for developing the full range of web sites and internet applications.

Studio MX 2004 provides professional functionality for every aspect of web development, all in one integrated package. Developers can build websites and applications with Dreamweaver, create interactive content with Flash, generate web graphics with Fireworks, and incorporate vector graphics with FreeHand. For developers delivering rich interactive applications, Studio MX 2004 is also available with Flash.

MX Professional 2004

Studio MX 2004 with Flash Professional includes everything in Studio MX 2004 plus the advanced capabilities of Flash MX Professional 2004.

K8903 STUDIO MX 2004

\$1,265

L1535 UPGRADE FROM STUDIO MX TO STUDIO MX 2004

\$615

MACROMEDIA® DREAMWEAVER MX 2004



Dreamweaver is now up to 50% faster on Windows and up to 70% faster on Mac than previous versions. The industry standard for HTML developers and designers; 91% of all web professionals choose Dreamweaver because it vastly outperforms everything else on the market.

With Dreamweaver, designers and developers can quickly and easily create visual layouts, develop powerful Internet applications and CSS (Cascading Style Sheets) structure, and edit code – using just one tool.

K8898 WIN/MAC

\$665

L4079 UPGRADE

\$315

MACROMEDIA® FLASH MX PROFESSIONAL 2004



Macromedia Flash MX 2004 is the most pervasive software platform on the planet, with over 436 million installed clients running on desktops, handhelds, mobile phones, and consumer electronics (including the Sony PlayStation®2).

Flash is the industry leader for creating and delivering rich content, like video, text, audio and graphics. Flash lets you stream rich content to users at all connection speeds.

K8908 WIN/MAC

\$1,135

MACROMEDIA® FIREWORKS MX 2004



Fireworks MX 2004 has the tools web professionals need to create everything from simple graphical buttons to sophisticated rollover effects. Readily import, edit, and integrate all major graphics formats, including vector and bitmap images. Easily export Fireworks images to Flash, Dreamweaver, and third-party applications

K8899 WIN/MAC

\$525

L3944 UPGRADE

\$235

MACROMEDIA CONTRIBUTE 3



Contribute allows non-technical users to update web content while maintaining site standards for style, layout, and code.

P7376 WIN/MAC

\$230

PLEASE NOTE:

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MIND YOUR OWN BUSINESS. SMARTER.

MYOB RETAILMANAGER 8



The complete retail picture. MYOB RetailManager is the perfect fit for businesses who require

comprehensive stock management, detailed reporting and more.

With MYOB RetailManager it is easy to keep track of every transaction in your store from sales, stock movements, GST and gross profit, right through to staff performance and even customer details.

S1237 FULL

\$1,650

MYOB RETAILREADY



MYOB RetailReady includes:

- MYOB RetailBasics POS software
- Posiflex Thermal Printer PP7000^A
- Posiflex Scanner CD2860^A
- Posiflex Cash Drawer CR3100^A

MYOB RetailBasics enables you to:

- Search for stock and maintain stock items
- Analyse what's selling, what's not and GST collected
- Manage Lay-bys and process refunds

R5316

\$789

MYOB RETAILREADY HARDWARE VIA REDEMPTION

^AThe Posiflex Thermal Printer PP7000, Scanner CD2860 and Cash Drawer CR3100 are available via redemption from MYOB (Colour of Posiflex hardware may vary due to availability). Product must be registered to redeem. Redemption form from inside the box must be completed and accompanied by proof of purchase. Standard postage of 50c applies to send in your redemption to MYOB.

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MYOB BUSINESSBASICS



With MYOB BusinessBasics you'll save lots of time and effort as it keeps your banking, sales and contact information in one easy to use system.

Issue professional-looking tax invoices, track all money coming in and out, and keep a detailed history of your business transactions. All your information is organised and easy to access so you can spend more time on your business, not on the books.

G4153

\$89

MYOB ACCOUNTING V15



MYOB Accounting is for businesses that need to streamline accounts procedures and would benefit from improved inventory management, better management of customer and supplier relationships and advanced business reporting.

R9042 FULL[#]

\$249

R9441 UPGRADE

\$239

MYOB ACCOUNTING PLUS V15



MYOB Accounting Plus comes with an award winning integrated payroll, is the ideal single-user business management tool and is a great accounting solution for smaller employers. MYOB Accounting Plus also makes it easy to track and charge for your time, and provides access to powerful profit-building information about your business.

MYOB PREMIER V9



MYOB Premier is for businesses that need to streamline accounts procedures, whether through simplifying complex inventory issues, running an automated payroll time billing, accessing advanced reporting or increasing productivity with multi-user access. This product comes with 12 months software support and upgrades.

R9227 FULL[#]

\$469

R9442 UPGRADE

\$259

R9228 FULL[#]

\$1,289

SOFTWARE

harris technology



Software

SOFTWARE FOR THE BUSINESS

PAYROLL PREMIER 2005/06



QUICKBOOKS POINT OF SALE 2005/06



Quicken

QUICKBOOKS ENTERPRISE 2005/06



Payroll Premier 2005/06 makes payroll QuickBooks easy giving you more time to manage your business. The best selling stand alone payroll software in Australia is designed to keep you up to date, compliant with the latest legislation, and grows your business needs grow.

QuickBooks Point of Sale 2005/06 requires QuickBooks to run, so to complete your store solution choose from QuickBooks Pro 2005/06 or QuickBooks Premier 2005/06 and take advantage of QuickBooks Premier's retail specific edition. Includes 12 Months Technical Support and Upgrades*.

Offers growing businesses the most comprehensive set of business management tools, including increased capacity, multi-company reporting, multi-currency and better tools to manage growth, while maintaining the ease-of-use of QuickBooks. Includes 12 Months Tech Support and Upgrades*

\$5259

\$570

N4560

\$450

\$6995

\$4,139

*Terms and conditions apply. Redemption forms and full terms and conditions are available at www.quickbooks.com.au/promotions * Normal Advantage terms & conditions apply.

ANTI-SPYWARE SOFTWARE

ANTI-SPYWARE BUNDLE

VET NET SURFER ANTI-VIRUS

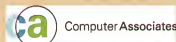
Vet Anti-Virus safeguards your computer from potentially harmful threats and viruses before they can cause harm. Its one year subscription includes:

- FREE virus updates, almost daily
- FREE product upgrades so your PC is always protected with the most up-to-date version
- FREE, unlimited 24 x 7 web support, plus access to our rich knowledge base and online tools

eTRUST PESTPATROL ANTI-SPYWARE

eTrust PestPatrol detects and removes a wide variety of spyware to protect your PC from unauthorised access, information theft and diminished system performance.

- Automatic updates
- Real-Time Protection kills active pests in memory and removes spyware cookies before they can collect and transmit your personal data.
- Proactive Spyware Detection and Removal protects you against new spyware threats



ANTI-SPAM



\$6968

\$46

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\$30 CASH BACK*

\$6960

\$125

*Cash back via redemption. For terms and conditions see computerassociates.ht.com.au

CRYSTAL REPORTS XI

CRYSTAL REPORTS XI
FEATURES:

New Free Runtime Licensing
Crystal Reports Developer Edition includes a royalty-free runtime license that allows for unlimited internal corporate deployment of the Crystal Reports .NET, Java, and COM (RDC) report engine components—without the need to pay additional licensing fees.

Dynamic and Cascading Prompts
Meet the needs of multiple users with a single report by basing report prompts on dynamic values. There is no longer any need to maintain static prompt value lists within individual reports because you can reuse existing prompts stored in the repository.

Dynamic Image Location
Place pictures and graphics in a report through a database link. This allows you to store images outside your database, freeing up precious database resources.

Editable RTF Format
Deliver reports to end users in a new RTF format, so they can easily make their own document modifications.

Intelligent Charting
Design a chart or have the best chart style automatically selected for you. This feature immediately updates your chart when new variables are added.

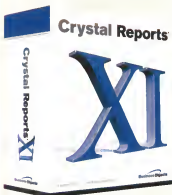
Hierarchical Grouping
Enhance the layout of your report and present data in a hierarchical, rather than relational manner. This is a perfect feature for organizational charts and summary reports.

And much more....

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Delivery charges may apply.
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CRYSTAL REPORTS XI PROFESSIONAL



Accessing and combining data from multiple sources is often complex and requires multiple tools. Transforming this data into useful information just adds to the burden. Crystal Reports XI Professional provides a unified standard for simplified data connectivity, flexible report creation, and reduced report maintenance. Not only can IT benefit from reduced overhead, but your end users will benefit from informed decision making.

CRYSTAL REPORTS® XI PROFESSIONAL IS DESIGNED TO:

- Increase productivity and reduce the time spent designing, managing and delivering reports via the web
- Experience high quality viewing, printing, and exporting
- An enhanced designer to speed up data access and formatting
- Dynamic cascading prompts to minimise report maintenance
- Editable RTF format to easily modify reports in standard word processing applications

Crystal Reports XI Professional comes with a 5 named user server license for accessing reports via the web. Additional concurrent access licenses are also available by purchasing Crystal Reports XI Server.

Crystal Reports XI Server is available for up to 20 concurrent users for a proven and powerful enterprise reporting solution.

R6068

CRYSTAL REPORTS PROFESSIONAL 11

\$595

CRYSTAL REPORTS XI SERVER

New to the Crystal Reports® product suite, Crystal Reports Server is a complete reporting solution that helps small and medium-sized businesses create, manage, and deliver reports—via the web or embedded in enterprise applications. It addresses all steps in the reporting process—from data access and report design, to report management and delivery, to report integration with portals and applications. And it includes Crystal Reports XI, the world standard for report creation, making it easy for you to share existing or new Crystal reports over the web. We've also included a year of technical support and maintenance for rapid deployment and peace of mind.

CRYSTAL REPORTS® XI SERVER IS DESIGNED FOR:

- Data access and report design
- Report management and delivery
- Portal and application integration
- Easy scalability for increased application longevity

Crystal Reports XI Server is a web management system for Crystal Reports editions from V6.0. to XI. It provides web delivery via the Infoview portal, fine grain security and 3rd party support, business views and a semantic layer to reduce the complexity of report access and creation, a new user interface and extensive report management capabilities. Program your reports to run over night using the scheduling feature with calendar and use the alerts feature to send an SMS message to your mobile phone.

R5389

CRYSTAL REPORTS SERVER

\$13,200



MICROSOFT WINDOWS XP WITH SERVICE PACK 2

WINDOWS XP SERVICE PACK 2 WITH ADVANCED SECURITY TECHNOLOGIES

Service Packs offer convenient, all-in-one access to the most up-to-date drivers, tools, security enhancements, and other critical updates. The latest service pack for Windows XP - Service Pack 2 (SP2) - is all about security improvements, and it's one of the most important service packs ever released.

SERVICE PACK 2 BENEFITS INCLUDE:

Take more control with Windows Security Centre - here you can check your Windows Firewall, AV Software and Windows Security updates easily in location.

Help protect your PC with the new Windows Firewall - a Firewall helps you to guard against unwanted attacks on your PC when you are connected to the Internet.

Block distracting pop-ups in Microsoft Internet Explorer - now you have the option to reduce unwanted advertising and content and stop wasted bandwidth by blocking unwanted advertising pop-ups.

Attachment Manager - helps protect against viruses that can spread through E-Mail, Windows Messenger and Internet Explorer by identifying potentially unsafe attachments.

Bluetooth Hardware Support - Bluetooth is the latest in wireless technology that enables you to link your PC with the latest Bluetooth-enabled wireless devices, including keyboards, mice, printers and mobile phones.

WINDOWS XP HOME -
WITH SERVICE PACK 2 INCLUDED

The most dependable Windows operating system yet

Windows XP sets the standard in efficient computing with a new visual design, the reliable Windows engine, and Internet security features.

Handle digital media like a pro

Transferring footage to your computer is faster and editing is easier than ever, with everything you need to create, edit, and share your home movies.

Get connected

Windows XP has built-in Internet, home networking, and real-time voice, video, and instant messaging support. Publish pictures to a Web site or shop online.

Use Remote Assistance to solve problems

Invite a friend or support professional to connect to your PC over the Internet to fix a problem or answer a question.

WINDOWS XP PROFESSIONAL -
WITH SERVICE PACK 2 INCLUDED

• Added features

The Professional Edition adds security and privacy, advanced recovery options, improved network connections, and more to the features of Home Edition.

• Superior mobile support

Work offline or access your computer remotely with ease with wireless networking support, configuration wizards, improved power management, and more.

• Greater security

Encrypt your files and folders with the highest levels of protection from hackers and data theft, and connect to Virtual Private Networks securely.

• Integrated and current

Integrate with Windows Servers and management solutions and keep your system current with automatic Windows Update.

Q0447

FULL

\$425

Q0452

FULL

\$295

Q0455

UPGRADE

\$150

Q0458

UPGRADE

\$305

Q0459

UPGRADE - ACADEMIC*

\$120

FOR CURRENT USERS
OF WINDOWS XP

If you already own Windows XP, it is strongly recommended by Microsoft to download and install Service Pack 2 (SP2). To do so you can download SP2 or arrange to have it shipped on CDROM.

BROADBAND USERS

Broadband users can download Microsoft Windows XP SP2 (100MB stand alone version). Microsoft has provided SP2 for free download at www.microsoft.com/australia/windows/sp2

DIAL-UP USERS

Due to the large file size of the Service Pack, we don't recommend you download it if you are on a dial-up connection. Dial-up users can instead order a Windows XP SP2 CD online.

www.microsoft.com/australia/windows/sp2

ORDERING

If you would rather have Windows XP SP2 delivered to you, see this web address www.microsoft.com/australia/windows/sp2 to order a CD version of SP2 by mail*

*Shipping and handling costs may apply

WINDOWS XP SP2 - SYSTEM
REQUIREMENTS

To install Windows XP SP 2 via CD, you need:

- A PC with Windows XP Home Edition, Professional, Media Center Edition or Tablet PC Edition installed
- 233MHz or higher processor
- 64MB of RAM or higher
- 1.6GB of available hard disk space during installation
- CD-ROM drive

*For non commercial use. Must be a Qualified Education User. For eligibility criteria visit: <http://www.microsoft.com/australia/education/howtobuy/meud/studentsandteachers.aspx>

PLEASE NOTE:

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MICROSOFT OFFICE

MICROSOFT® STUDENT
2006

Microsoft® Student 2006 provides the trusted homework tools and resources high school students need for academic success.

- Provides templates and tutorials for Microsoft® Word, Excel and PowerPoint®, to help students create high quality reports and presentations
- Full-feature graphing calculator helps students visualise and solve maths and science problems
- Includes Encarta Reference Library 2006
- Provides editorially approved content without launching additional applications when students search for information on the internet
- Tools and guides offer organised steps to help students start and complete projects and reports

FULL

S7192

\$150

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MICROSOFT PROFESSIONAL EDITION 2003
ACADEMIC

Microsoft Office Professional Edition 2003 can help you and your organisation communicate information with immediacy and impact. New and familiar programs and improved functionality help you build powerful connections between people, information, and business processes.

L0803

ACADEMIC*

\$249

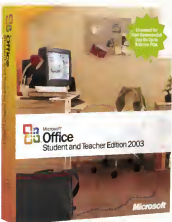
OFFICE SMALL BUSINESS 2003 UPGRADE

Microsoft Office Small Business Edition 2003 is a personal and business productivity solution that enables small-business employees to:

- More effectively manage customers and sales opportunities
- Create impressive sales and marketing materials
- Manage e-mail and share information efficiently and securely

L0827

UPGRADE

\$435

OFFICE STUDENT & TEACHER EDITION 2003

Microsoft Office Student & Teacher Edition 2003 enables you to complete your document-related tasks easily, and allows you and your family to gain the familiarity and skills that will keep each of you ahead of the curve at school and at work.

Offered at the best prices for home users – Office 2003 Student & Teacher Edition includes full versions of Office products (Word, Excel, PowerPoint and Outlook 2003).

L0802

ACADEMIC*

\$215

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MICROSOFT OFFICE APPLICATIONS

VISIO STANDARD 2003

Visio Standard 2003 enables users to visualise, document, communicate, and share ideas with attention-grabbing flowcharts, organisation charts, office layouts, and more.

L1540 FULL **\$299**

L1542 UPGRADE **\$155**

L1546 ACADEMIC* **\$99**

VISIO PROFESSIONAL 2003

Visio Professional 2003 gives IT professionals, engineers, and developers comprehensive technical diagramming and drawing tools to create and share information.

L1543 FULL **\$739**

L1544 UPGRADE **\$375**

L1547 ACADEMIC* **\$215**

MICROSOFT FRONTPAGE 2003

Microsoft® Office FrontPage® 2003 is the Web site creation and management tool that gives you the features, flexibility and functionality to help you build better Web sites. FrontPage delivers the professional design, authoring, data, and publishing tools customers have asked for to create dynamic and sophisticated web sites.

L0812 FULL **\$325**

L0813 UPGRADE **\$170**

L0814 ACADEMIC* **\$150**

MICROSOFT PUBLISHER 2003

Comprehensive solution for creating and publishing a wide variety of publications for desktop printing, commercial printing, e-mail distribution, or viewing on the Web. Start from professionally designed templates that you can customise with colour schemes, font schemes, various layout options, and your own design sense.

L0820 FULL **\$275**

L0821 UPGRADE **\$159**

L0822 ACADEMIC* **\$145**

* For non commercial use. Must be a Qualified Education User. For eligibility criteria visit: <http://www.microsoft.com/australia/education/howtobuy/meud/studentsandteachers.aspx>

MICROSOFT® ONENOTE™ 2003



Microsoft Office OneNote 2003, is the Microsoft Office System note-taking and management program that enables you to capture, organise, and reuse your notes on laptop computers, desktop computers, or Tablet PCs.

FULL

L0906

\$149

ACADEMIC*

L0907

\$79

MICROSOFT® PROJECT STANDARD 2003



Project Standard 2003 is designed to improve your ability to organise work and communicate effectively and succinctly through familiar, easy-to-use tools.

FULL

L3553

\$929

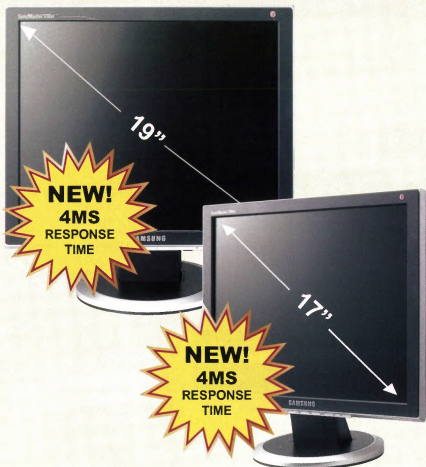
ACADEMIC*

L3231

\$119

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19" TFT MONITOR

930BF

- Pixel pitch: 0.294 mm
- Contrast ratio: 700:1
- Viewing Angle (H/V): 160° / 160°
- Response Time: 4ms (Grey to Grey)
- Interface: Analogue / Digital
- Maximum resolution: 1280x1024
- 3 year on site exchange and zero dead pixel policy^A

Rent* \$8.17/w

S6833 **\$729**

17" TFT MONITOR

730BF

- Pixel pitch: 0.264 mm
- Contrast ratio: 600:1
- Viewing Angle (H/V): 160° / 160°
- Response Time: 4ms (Grey to Grey)
- Interface: Analogue / Digital
- Maximum resolution: 1280x1024
- 3 year on site exchange^A

S6830 **\$529**

^ASee page 36 for details

BUSINESS CENTRE LOCATIONS

NSW

NORTH RYDE

45 Epping Road
North Ryde NSW 2113

NORTH SYDNEY

Ground Floor Bayer Building
275 Alfred Street North
North Sydney NSW 2060

PARRAMATTA

46 George Street
Parramatta NSW 2150

ALEXANDRIA

Unit 1, 110 Botany Road
Alexandria NSW 2015

VIC

HAWTHORN EAST

612 Burwood Road
Hawthorn East VIC 3123

ACT

FYSHWICK

29-31 Townsville Street
Fyshwick ACT 2609

QLD

FORTITUDE VALLEY

356 St Pauls Terrace
Fortitude Valley QLD 4006

WA

OSBORNE PARK

426 Scarborough Beach Rd
Osborne Park WA 6017

SA

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OFFICE ONLY



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Xtreme Fidelity

Sound
BLASTER®



A Revolutionary Audio Platform for an Experience Beyond Your Imagination

COMING SOON

FEATURING:

XTREME FIDELITY MP3 MUSIC • XTREME FIDELITY GAMES • XTREME FIDELITY MOVIES • XTREME FIDELITY MUSIC CREATION



www.au.creative.com

CREATIVE



EP50839

USING THE WRONG INKS MAY ALSO DAMAGE YOUR PRINTER.



Using genuine EPSON inks will protect your print head and extend your printer's life. Independent research has proven that our inks improve photo quality, longevity and stability. So every memory can last for up to 92 years.* EPSON ink cartridges also give up to 30% more printouts per cartridge than third party ink cartridges*. We could go on, but it wouldn't be fair to our competitors. Call 1300 361 054 or visit us at www.epson.com.au